

Autonomous Syllabus & Curriculum

OFFERED BY

Department of Mathematics

S. No	Sub. Code	Sub. Title	Departments	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra	Chemical / CIVIL / MECH / CSE / IT / AGRI (for AGRI only in 2019-20)	BS	3	1	0	4	2-2	-
2	19MA202	Calculus and Laplace Transforms	ECE / Bio-MED / MED- ELEC/ EEE / EIE	BS	3	1	0	4	2-2	-
3	19MA208	Calculus and Matrices (Only for AGRI) (from Acad. Year 2020-21) (Theory cum Practical)	AGRI	BS	2	0	2	3	2-2	• Theory C- 2 • Practical C – 1 • No Observation • Only record
						•	1			
4	19MA203	Complex Variables and Differential Equations (Theory cum Practical)	AGRI	BS	2	0	2	3	2-2	19MA201/ 19MA208 • Theory C- 2 • Practical C – 1 • No Observation • Only record
5	19MA204	Complex Variables and Ordinary Differential Equations	ECE / Bio-MED / MED- ELEC	BS	3	1	0	4	2-2	19MA202
6	19MA205	Differential Equations and Laplace Transforms	Chemical / CIVIL / MECH	BS	3	1	0	4	2-2	19MA201

7	19MA206	Logic and Combinatorics	CSE / IT	BS	3	1	0	4	2-2	19MA201
8	19MA207	Numerical Methods and Partial Differential Equations	EEE / EIE	BS	3	1	0	4	2-2	19MA202
9	19MA209	Numerical Methods	Chemical	BS	3	1	0	4	2-2	19MA201
10	19MA210	Transforms and Partial Differential Equations	Bio-MED	BS	3	1	0	4	2-2	19MA202
11	19MA211	Statistics and Numerical Methods (Theory cum Practical)	CIVIL / MECH	BS	3	0	2	4	2-1-2	19MA201 • Theory C- 2 • Practical C – 1 • No Observation • Only record
12	19MA212	Algebra and Number Theory	CSE / IT	BS	3	1	0	4	2-2	19MA201
13	19MA213	Linear Algebra and Numerical Methods	ECE / MED-ELEC	BS	3	1	0	4	2-2	19MA202
14	19MA214	Series and Transforms	EEE / EIE	BS	3	1	0	4	2-2	19MA202
15	19MA215	Numerical Analysis and Laplace Transformation (Theory cum Practical)	AGRI	BS	2	0	2	3	2-2	 19MA201/19MA208 Theory C- 2 Practical C - 1 No Observation Only record
16	19MA217	Random Processes and Statistics	ECE / Bio-MED / MED- ELEC	BS	3	1	0	4	2-2	19MA202

17	19MA218	Probability and Queueing Theory	CSE / IT	BS	3	1	0	4	2-2	19MA201		
	UG Open Electives											
18	19MA601	Resource Management Techniques	Common to All	OE	3	0	0	3	2-1	-		
19	19MA602	Statistics for Engineers	Common to All	OE	3	0	0	3	2-1	-		

			PG PA	PERS						
20	19MMA01	Applied Mathematics for Electronics Engineers	ME (AE & VLSI)	BS	3	1	0	4	2-2	-
21	19MMA02	Applied Mathematics for Communication Engineers	ME (CN)	BS	3	1	0	4	2-2	-
22	19MMA03	Applied Mathematics for Engineers	ME (CAD / CAM)	BS	3	1	0	4	2-2	-
23	19MMA04	Applied Probability and Statistics	ME (CSE & SE)	BS	3	1	0	4	2-2	-
24	19MMA06	Applied Mathematics for Electrical Engineers	ME (EST)	BS	3	1	0	4	2-2	-
25	19MMA05	Linear Algebra and Number Theory	ME (CSE)	OE	3	1	0	4	2-2	-

PROGRAM OUTCOMES (POs)

- 1) **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2) **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3) **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4) **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5) **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6) **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7) **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9) **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- 10) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11) **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12) **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Updated Program Specific Outcomes (PSOs) of All Departments (as on Jan 2020)

		1) Design and develop electronic circuits, equipment and systems
		2) Apply hardware and software programming skills for
	_ ~ _	implementing Electronics and Communication Systems
1	ECE	3) Provide real time solutions using existing and emerging
		technologies in the field of Electronics and Communication
		Engineering
		1) Design and Develop diagnostic and therapeutic devices.
		2) Develop and implement Computation Program for solving
2	BIO MED	healthcare related problems.
		3) Develop a Prosthetic device.
		1) To design and develop Medical devices by relating Medical
3	MED ELEC	science and Evolving Engineering.
		2) To apply Interdisciplinary Approaches for Healthcare Solutions.
		1) Design and Compute computer programs using appropriate
		algorithm, programming language and principles of mathematics.
		CSE
4	CSE	engineering problems.
		3) Create innovative solutions for web and mobile based applications
		using recent technologies.
		1) Acquire knowledge to analyze, design and implement IT solutions
_	I	to real-time Challenges using current technologies.
5	IT	2) Apply computational IT skills in Real world environment to
		enhance entrepreneurship and employability requirements.
		1) To develop product/process design for mechanical systems.
		2) To evaluate the mass and energy flow in thermal systems.
6	MECH	3) To select suitable manufacturing process to meet industrial
		requirements.
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		1) To Plan, Analyse and Design Civil Structures.
7	CIVIL	2) To Execute Civil Engineering Projects by taking into account the
/	CIVIL	economical, environmental, societal, health and safety factors
		involved in infrastructural development
		1) To develop expertise in design and engineering problem solving
		approach in agriculture with proper training and knowledge
		2) To enhance students ability to formulate solutions to real-world
		problems pertaining to sustained agricultural productivity using
8	AGRI	modern technologies and management of agricultural products
		through value-addition and preservation
		3) To inculcate entrepreneurial skills through strong Industry-
		Institution linkage
		1) Employ fundamental knowledge of electrical and electronics
		engineering to formulate, analyse and design smart and
9	EEE	sustainable electrical systems.
		2) Demonstrate proficiency in use of modern software tools to
		analyse, simulate and design electrical and electronics systems.
		1) Acquire technical skills to solve problems and challenges in the
		field of instrumentation with robust control tools.
10	EIE	2) Apply the concepts of measurement and control techniques to
		setup and monitor instruments in process industries.
		1) Analyze process calculations, material & energy balances,
		thermodynamics, unit operations & process control and evaluate
		chemical reaction engineering and transport processes.
		2) Analyze process economics, project engineering safety and
11	CHEM	environment aspects and sustainable development to work in
		traditional and emerging chemical engineering areas.
		3) Design equipment for chemical processing and analyze innovative
		chemical processes.
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Department of Agricultural Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201*	Calculus and Matrix Algebra Only in 2019-2020)	BS	3	1	0	4	2-2	-
2	19MA208*	Calculus and Matrices (from Acad. Year 2020)	BS	2	0	2	3	2-2	-
3	19MA203*	Complex Variables and Differential Equations B		2	0	2	3	2-2	19MA201/ 19MA208
4	19MA215	Numerical Analysis and Laplace Transformation	BS	2	0	2	3	2-2	19MA201/ 19MA208

Note:

*Exempted for Lateral Entry Students

All papers are Lab cum Theory

No Observation; Only Record for Practical

Theory Credit – 2; Lab Credit – 1

19MA201	Calculus and Matrix Algebra	LTPC
19MA201	Ŭ	3 1 0 4

(COMMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

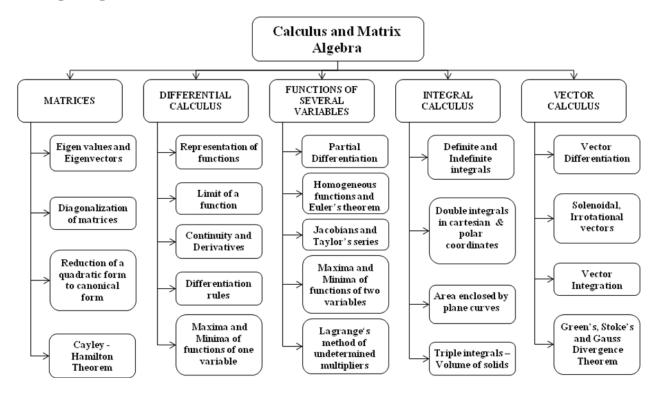
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

	AGRI														
Course															
Outcomes		Program Outcomes										Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2	1
CO2	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	-
CO4	3	3	1	-	-	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	1	-	2



SYLLABUS

UNIT I	MATRICES	12						
and Eigenvect	Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.							
UNIT II	DIFFERENTIAL CALCULUS	12						
Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.								
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12						
variables – Ja	ntiation – Homogeneous functions and Euler's theorem – Total derivation of two variables – Maxima and mines – Lagrange's method of undetermined multipliers.	U						
UNIT IV	INTEGRAL CALCULUS	12						
	Indefinite integrals - Double integrals – Double integrals in polar coo ane curves – Triple integrals – Volume of solids.	rdinates – Area						
UNIT V	VECTOR CALCULUS	12						
integration -	rgence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds.							
	TOTAL	L: 60 PERIODS						
2015. 2) James Ste	KS: B.S., —Higher Engineering Mathematicsl, Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10t	lew Delhi, 2015.						
REFERENC		,						
 Anton, H, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. Jain R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New Delhi, 5th Edition, 2016. Narayanan, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Viswanathan 								
Publishers Pvt. Ltd., Chennai, 2009.								
,	a Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Press, an.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, NewDo							

Course Designers:

1 Ms. N. Jegajothi

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2 Ms. P. S. Narmathadevi narmathadevi@saveetha.ac.in

(ONLY TO AGRI from Academic Year 2020-21 instead of 19MA201)

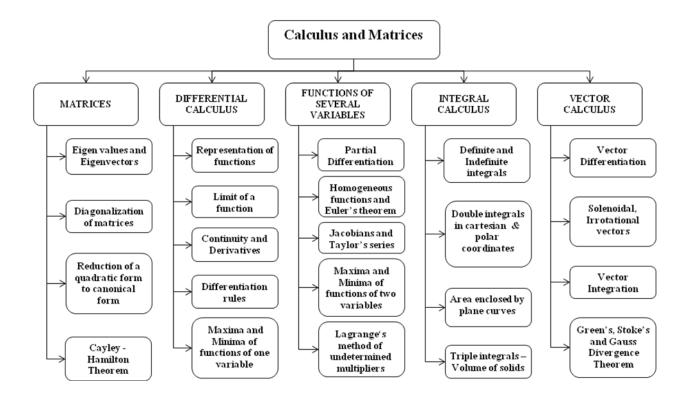
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

								AGI	RI						
Course															
Outcomes					F	rogra	n Out	comes					Program	n Specifi	c Outcomes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2	1
CO2	3	2	2	1	-	-	-	-	-	-	-	1	2	1	-
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	-
CO4	3	3	1	-	-	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	1	-	2



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SYLLABUS

UNIT I	MATRICES	12
and Eigenvec	and Eigenvectors of a real matrix – Characteristic equation – Properties of tors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	
UNIT II	DIFFERENTIAL CALCULUS	12
*	n of functions - Limit of a function - Continuity - Derivatives - Differ Minima of functions of one variable.	rentiation rules -
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
variables – Ja	entiation – Homogeneous functions and Euler's theorem – Total derivati cobians – Taylor's series for functions of two variables – Maxima and min les – Lagrange's method of undetermined multipliers.	
UNIT IV	INTEGRAL CALCULUS	12
	Indefinite integrals - Double integrals - Double integrals in polar coolane curves - Triple integrals - Volume of solids.	ordinates – Area
UNIT V	VECTOR CALCULUS	12
integration -	ergence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds.	
	TOTAL	L: 60 PERIODS
TEXT BOO		
1) Grew 2015	al B.S., —Higher Engineering MathematicsI, Khanna Publishers, New Delh	i, 43rd Edition,
2) Jame 2015	s Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition	ı, New Delhi,
3) Krey 2015	szig.E Advanced Engineering Mathematics, John Wiley & Sons. Singapore,	10th edition,
REFERENC	ES :	
1) Antor	n, H, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016.	
	R.K. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Public, 5th Edition, 2016.	cations, New
	yanan, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. V shers Pvt. Ltd., Chennai, 2009.	iswanathan
4) Srima	antha Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Pre	ess, 2015.
· · · · ·	arajan.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, New n, 2013.	vDelhi, 5th

Course Designers:

1	Ms. N. Jegajothi	jegajothi@saveetha.ac.in
2	Ms. P. S. Narmathadevi	narmathadevi@saveetha.ac.in

(ONLY FOR AGRI)

Preamble:

This course is designed to cover the topics such as complex variables, Fourier series and Differential equations. Fourier series are widely used in signal analysis and the syllabus includes various techniques to solve ordinary and partial differential equations which are essential to handle practical problems arising in the field of engineering.

Prerequisite :

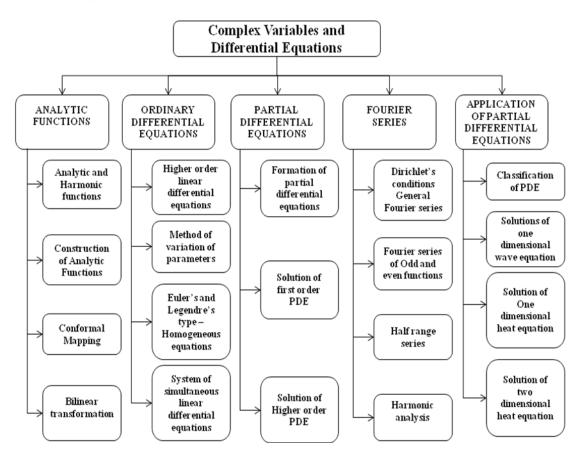
19MA201 - Calculus and Matrix Algebra (2019-2020) (OR)

19MA208 - Calculus and Matrices (2020-2021)

CO1	Analyze the suitable techniques for solving second and higher order differential equations	Analyze
CO2	Evaluate differential equations using Bessel's and Legendre and to construct analytic functions	Evaluate
CO3	Evaluate Fourier Series for standard periodic waveforms	Evaluate
CO4	Apply suitable concepts in solving first and higher order partial differential equations with constant coefficients.	Apply
CO5	Analyze and obtain the solutions of wave and heat equations using Fourier series.	Analyze

						A	GRI							
				I	Program	n Outc	omes						_	
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2	3	2	2	-	-	-	-	-	-	-	1	1	2	1
2	3	2	2	-	-	-	-	-	-	-	1	1	2	-
3	3	2	2	-	-	1	-	-	-	-	1	2	3	1
2	2	2	3	-	-	1	-	-	-	-	1	2	3	1
3	3	2	2	-	-	1	-	-	-	-	1	2	3	1
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3 -Strong; 2 -Medium; 1 -Low



SYLLABUS

UNIT I	ANALYTIC FUNCTIONS	12
Functions of a	a complex variable - Limit-continuity and analytic functions-Cauchy-Rie	mann equations
Harmonic fund	ctions – Construction of analytic function by Milne Thomson method.	
UNIT II	ORDINARY DIFFERENTIAL EQUATIONS	12
Exact and Ber	rnoulli's differential equations – equations reducible to exact form by int	egrating factors
equations of f	first order and higher degree-Clairaut's equation-Differential equations o	of higher orders
method of find	ding complementary functions and particular integrals-method of variation	s of parameters
Cauchy and	Legendre's linear equations-Simultaneous linear differential equations	s with constar
coefficients- S	beries solution techniques – Bessel's and Legendre's differential equations	
UNIT III	FOURIER SERIES	12
Periodic func	tions-Fourier series-Euler's formulae- Dirichlet's conditions-Functions	having arbitrar
	er series for function having period 2L - Even and odd functions - H	•
-	nd Cosine series - Harmonic analysis.	C
UNIT IV	PARTIAL DIFFERENTIAL EQUATIONS	12
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	partial differential equations using elimination of arbitrary constan	ts and arbitrar
Formation of	partial differential equations using elimination of arbitrary constaning order linear partial differential equations with constant coefficients –	
Formation of functions – Hi	igher order linear partial differential equations with constant coefficients -	
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Formation of functions – Hi linear partial d UNIT V Classification	igher order linear partial differential equations with constant coefficients – lifferential equations – Charpit's method. APPLICATION OF PDE of PDE – Solutions on one dimensional wave equation – One dimensional	Solution of nor 12 sional heat flow
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Formation of functions – Hi linear partial d UNIT V Classification equations –Ste insulated edge TEXT BOOK 1) Grewa Editio 2) Rama	igher order linear partial differential equations with constant coefficients – lifferential equations – Charpit's method. APPLICATION OF PDE of PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplace Equals eady state solution of two dimensional heat flow equations - Laplace Equals (S) TOTAL KS: al B.S 2004, "Higher Engineering Mathematics , Khanna Publishers, Ton,2014. na B.V2008, "Engineering Mathematics", Tata McGraw Hill, New Delhi.	Solution of nor 12 sional heat flow ation (excludin L: 60 PERIOD
Formation of functions – Hi linear partial d UNIT V Classification equations –Ste insulated edge TEXT BOOK 1) Grewa Editio 2) Rama REFERENC	igher order linear partial differential equations with constant coefficients – lifferential equations – Charpit's method. APPLICATION OF PDE of PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplace Equals eady state solution of two dimensional heat flow equations - Laplace Equals (S) TOTAL KS: al B.S 2004, "Higher Engineering Mathematics , Khanna Publishers, 1 on,2014. na B.V2008, "Engineering Mathematics", Tata McGraw Hill, New Delhi. ES :	Solution of nor 12 sional heat flow ation (excludin L: 60 PERIOD New Delhi 43
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Formation of functions – Hi linear partial d UNIT V Classification equations –Ste insulated edge TEXT BOOK 1) Grewa Editio 2) Rama REFERENCI 1) Bali N imprin	igher order linear partial differential equations with constant coefficients – differential equations – Charpit's method. APPLICATION OF PDE of PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplace Equals eady state solution of two dimensional heat flow equations - Laplace Equals (S) TOTAL KS: al B.S 2004, "Higher Engineering Mathematics , Khanna Publishers, " n,2014. na B.V2008, "Engineering Mathematics", Tata McGraw Hill, New Delhi. ES : N,Goyal M and Watkins C, "Advanced Engineering Mathematics", Firewall nt of Lakshmi Publications Pvt Ltd) New Delhi , 7 th Edition 2009.	Solution of nor 12 sional heat flow ation (excludin L: 60 PERIOD New Delhi 43
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2) Ms. K.Ashwini ashwini.k@saveetha.ac.in

L	T	Р	C	
2	0	2	3	

(ONLY FOR AGRI)

Preamble:

The course is designed to acquaint the students about the various techniques of numerical analysis such as solution of linear system of equations, interpolation and approximation, numerical differentiation and integration, numerical solution of differential equations. The syllabus also includes Laplace transforms in which various methods can be applied to transform the time domain circuits into frequency domain to simplify the solution of differential equations. It helps to understand the concept of testing the hypothesis in small and large samples in real life problems in addition to correlation and regression between random variables.

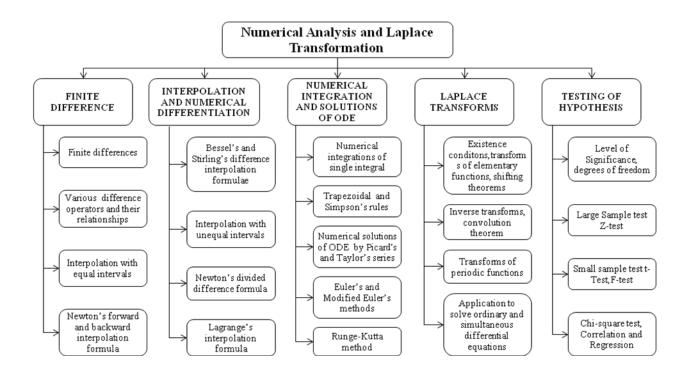
Prerequisite:

19MA201 - Calculus and Matrix Algebra (OR)19MA208 – Calculus and Matrices

CO1	Analyzing the finite differences using Newton's forward and backward interpolation	Analyze
CO2	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply
CO3	Applying Simpson's and Trapezoidal rule in solving numerical integration	Apply
CO4	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate
CO5	Understand the various applications of t and F distributions in statistics and correlation and between random variables	Understand

							AGRI								
Course Outcomes					Pro	gram O	outcome	s						am Speo itcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	-	-	-	-	-	-	-	1	1	2	1
CO2	2	3	2	2	-	-	-	-	-	-	-	1	1	2	-
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	3	1
CO4	2	2	2	3	-	-	1	-	-	-	-	1	2	3	1
CO5	3	3	2	2	-	-	1	-	-	-	-	1	2	3	1

3-Strong; 2-Medium; 1-Low



19MA215	
1/1/1/213	

Numerical Analysis and Laplace Transformation

LTPC

(Theory 2C and Lab 1C)

2 0 2 3

(SYLLABUS)

UNIT I	[FINITE DIFFERENCE	12
Newtor	n's forv	ce-various difference operators and their relationships-interpolation with vard and backward interpolation formula. Numerical differentiations usi ackward interpolation.	
UNIT I	Π	INTERPOLATION AND NUMERICAL DIFFERENTIATION	12
		Stirling's difference interpolation formulae-Interpolation with unequal in ence formula - Lagrange's interpolation formula.	tervals-Newton's
UNIT I	III	NUMERICAL INTEGRATION AND SOLUTIONS OF ODE	12
	y diffei	egrations of single integrals using Trapezoidal and Simpson's rules-Nun rential equations by Picard's and Taylor's series-Euler's and Modified E nethod	
UNIT I	IV	LAPLACE TRANSFORMS	12
		ditions-Transforms of elementary functions-basic properties-shifting the province of the periodic functions-Application to solution theorem-Transform of periodic functions-Application to solutions and the periodic functions are solutions are solutions.	
		and simultaneous differential equations	
	rdinary		12
order of UNIT V Level o t-test (0	rdinary V of signi One-tai	and simultaneous differential equations	– Small sample tes
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- 2) Ms. K.Ashwini ashwini.k@saveetha.ac.in



Department of Biomedical Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA202	Calculus and Laplace Transforms*	BS	3	1	0	4	2-2	-
2	19MA204	Complex Variables and Ordinary Differential Equations*	BS	3	1	0	4	2-2	19MA202
3	19MA210	Transforms and Partial Differential Equations	BS	3	1	0	4	2-2	19MA202
4	19MA217	Random Processes and Statistics	BS	3	1	0	4	2-2	19MA202

Note:

*Exempted for Lateral Entry Students

(COMMON TO BIO MED, ECE, EEE, EIE & MED ELEC)

Preamble:

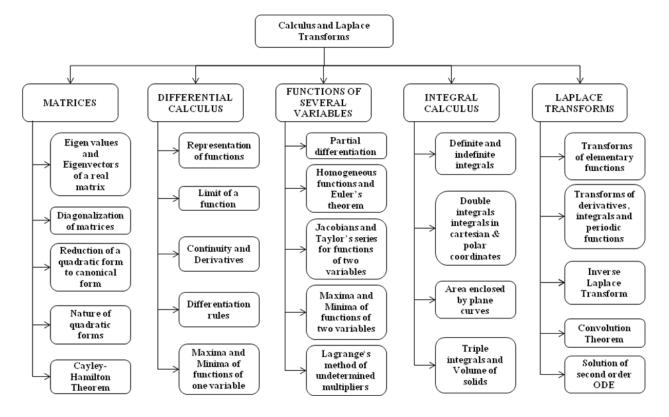
The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines. The syllabus also includes Laplace transforms in which various methods can be used to transform the time domain circuits to frequency domain to simplify the solution of differential equations.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

	BIO MED															
Course Outcomes		Program Outcomes Program Specific Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	3	2	1	-	-	-	-	-	-	-	1	3	2	2	
CO2	3	3	2	-	-	-	-	-	-	-	-	1	2	1	1	
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	-	
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	-	2	
CO5	2	3	2	1	-	-	-	-	-	-	-	-	3	1	3	

3 – Strong; 2 – Medium; 1-Low



SYLLABUS

UNIT I	MATRICES	12
- Cayley-Hamilton	igenvectors of a real matrix – Characteristic equation – Properties of Eigen van theorem – Diagonalization of matrices – Reduction of a quadratic form mation – Nature of quadratic forms.	
UNIT II	DIFFERENTIAL CALCULUS	12
Representation of f of functions of one	Functions - Limit of a function - Continuity - Derivatives - Differentiation ruvariable.	iles -Maxima and Minim
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
	on – Homogeneous functions and Euler's theorem – Total derivative – Chang or functions of two variables – Maxima and minima of functions of two varia ultipliers.	
UNIT IV	INTEGRAL CALCULUS	12
Definite and Indefi	inite integrals - Double integrals - Double integrals in polar coordinates -	- Area enclosed by plan
curves – Triple inte	grals – Volume of solid	
curves – Triple inte	egrals – Volume of solid LAPLACE TRANSFORMS	12
UNIT V Existence condition Basic properties – S transforms – Conve	-	nd unit impulse function value theorems – Invers
UNIT V Existence condition Basic properties – S transforms – Conve	LAPLACE TRANSFORMS ns – Transforms of elementary functions – Transform of unit step function ar Shifting theorems -Transforms of derivatives and integrals – Initial and final olution theorem – Transform of periodic functions – Application to solution	nd unit impulse function value theorems – Invers
UNIT V Existence condition Basic properties – S transforms – Convo ordinary differentia TEXT BOOKS: 1. Grewal B.S., 2. Kreyszig.E A 3. Sanjay Mish	LAPLACE TRANSFORMS ns – Transforms of elementary functions – Transform of unit step function ar Shifting theorems -Transforms of derivatives and integrals – Initial and final olution theorem – Transform of periodic functions – Application to solution	nd unit impulse function value theorems – Invers on of linear second orde TOTAL: 60 PERIOD dition, 2015. tion, 2015.
UNIT V Existence condition Basic properties – S transforms – Convo ordinary differentia TEXT BOOKS: 1. Grewal B.S., 2. Kreyszig.E A 3. Sanjay Mish: REFERENCES : 1. Anton, H, Bi 2. Jain R.K. and 2016.	LAPLACE TRANSFORMS ns – Transforms of elementary functions – Transform of unit step function ar Shifting theorems -Transforms of derivatives and integrals – Initial and final olution theorem – Transform of periodic functions – Application to solution l equations with constant coefficients. , —Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10th edi	nd unit impulse function value theorems – Invers on of linear second orde TOTAL: 60 PERIOD dition, 2015. tion, 2015. ndia, June 2016. New Delhi, 5th Edition,

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- 2. Mr.L.Vigneswaran vigneswaranl@saveetha.ac.in

(COMMON TO ECE, BME & MED ELEC)

Preamble:

This course is designed to cover topics such as Vector Calculus, Complex Analysis, Sequences and series. Vector calculus and differential equations can be widely used for modeling the various laws of physics. The syllabus includes concepts of analytic functions which are applied to evaluate Contour Integrals.

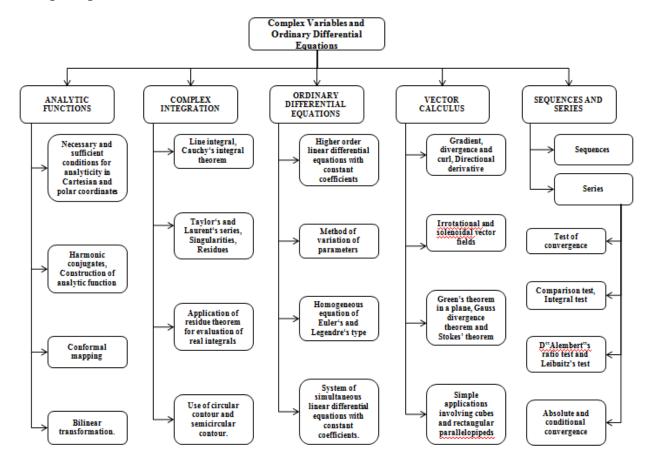
Prerequisite:

19MA202 - Calculus and Laplace Transforms

CO1	Identify and construct analytic functions and conformal mapping.	Apply
CO2	Understand the fundamental concepts of complex analysis and apply them to evaluate contour integrals.	Apply
CO3	Analyze various techniques in solving ordinary differential equations.	Analyze
CO4	Determine the vector differentiation and vector integration.	Evaluate
CO5	Test the convergence of infinite series and evaluate the limits.	Evaluate

	BIO MED														
Course Outcomes		Program Outcomes Program Specific Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2
CO2	3	2	-	-	-	-	-	-	-	-	-	1	2	2	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	1	2
CO4	3	3	1	1	-	-	-	-	-	-	-	-	2	-	1
CO5	3	2	1	1	-	-	-	-	-	-	-	1	2	1	1

3 – Strong; 2 – Medium; 1-Low



SYLLABUS

UNIT I	ANALYTIC FUNCTIONS	12
Analytic funct Properties –	tions – Necessary and sufficient conditions for analyticity in Cartesian and p Harmonic conjugates – Construction of analytic function – Confo z^2 , Bilinear transformation.	polar coordinates -
UNIT II	COMPLEX INTEGRATION	12
Singularities	- Cauchy's integral theorem – Cauchy's integral formula – Taylor's and – Residues – Residue theorem – Application of residue theorem for e e of circular contour and semicircular contour.	
UNIT III	ORDINARY DIFFERENTIAL EQUATIONS	12
Homogenous	linear differential equations with constant coefficients - Method of variation equation of Euler's and Legendre's type – System of simultaneous n constant coefficients.	
UNIT IV	VECTOR CALCULUS	12
	ergence and curl – Directional derivative – Irrotational and solenoidal vec	tor fields –Vector
integration -	Green's theorem in a plane, Gauss divergence theorem and Stokes' th ple applications involving cubes and rectangular parallelopipeds.	
integration -	Green's theorem in a plane, Gauss divergence theorem and Stokes' th	
integration – proofs) – Simp UNIT V Sequences: De convergence:	Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelopipeds.	eorem (excluding 12 ve terms – Tests of
integration – proofs) – Simp UNIT V Sequences: De convergence:	Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelopipeds. SEQUENCES AND SERIES efinition and examples – Series: Types and Convergence – Series of positiv Comparison test, Integral test and D'Alembert's ratio test – Alternating a f positive and negative terms – Absolute and conditional convergence	eorem (excluding 12 ve terms – Tests of
integration – proofs) – Simp UNIT V Sequences: Do convergence: test – Series o TEXT BOOH 1) Bali M Public	Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelopipeds. SEQUENCES AND SERIES efinition and examples – Series: Types and Convergence – Series of positiv Comparison test, Integral test and D'Alembert's ratio test – Alternating is f positive and negative terms – Absolute and conditional convergence TOTA KS: N. P and Manish Goyal, "A Text book of Engineering Mathematics", Nine cations Pvt Ltd., 201	eorem (excluding 12 /e terms – Tests of series – Leibnitz's AL: 60 PERIODS eth Edition, Laxmi
integration – proofs) – Simp UNIT V Sequences: Do convergence: test – Series o TEXT BOOH 1) Bali M Public	Green's theorem in a plane, Gauss divergence theorem and Stokes' th ple applications involving cubes and rectangular parallelopipeds. SEQUENCES AND SERIES efinition and examples – Series: Types and Convergence – Series of positiv Comparison test, Integral test and D'Alembert's ratio test – Alternating a f positive and negative terms – Absolute and conditional convergence TOTA KS: N. P and Manish Goyal, "A Text book of Engineering Mathematics", Nine cations Pvt Ltd., 201 al. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publicati	eorem (excluding 12 ve terms – Tests of series – Leibnitz's AL: 60 PERIODS eth Edition, Laxmi
integration – proofs) – Simp UNIT V Sequences: De convergence: test – Series o TEXT BOOF 1) Bali M Public 2) Grewa REFERENCI 1) D 20	Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelopipeds. SEQUENCES AND SERIES efinition and examples – Series: Types and Convergence – Series of positiv Comparison test, Integral test and D'Alembert's ratio test – Alternating & f positive and negative terms – Absolute and conditional convergence TOTA KS: N. P and Manish Goyal, "A Text book of Engineering Mathematics", Nine cations Pvt Ltd., 201 al. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publicati ES : ass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. C 011	eorem (excluding 12 /e terms – Tests of series – Leibnitz's AL: 60 PERIODS eth Edition, Laxmi ons, Delhi, 2014. Chand Private Ltd.
integration – proofs) – Simp UNIT V Sequences: De convergence: test – Series o TEXT BOOH 1) Bali M Public 2) Grewa REFERENCE 1) D 20 2) Pe 3) R	Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelopipeds. SEQUENCES AND SERIES efinition and examples – Series: Types and Convergence – Series of positiv Comparison test, Integral test and D'Alembert's ratio test – Alternating is f positive and negative terms – Absolute and conditional convergence TOTA KS: N. P and Manish Goyal, "A Text book of Engineering Mathematics", Nine cations Pvt Ltd., 201 al. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publicati ES : ass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. C	I2 ve terms – Tests or series – Leibnitz's AL: 60 PERIODS eth Edition, Laxm ons, Delhi, 2014. Chand Private Ltd. e learning, 2012.

Course Designers:

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- 2. Ms.M.Gayathrilakshmi gayathrilakshmi@saveetha.ac.in

(ONLY FOR BIO MED)

Preamble :

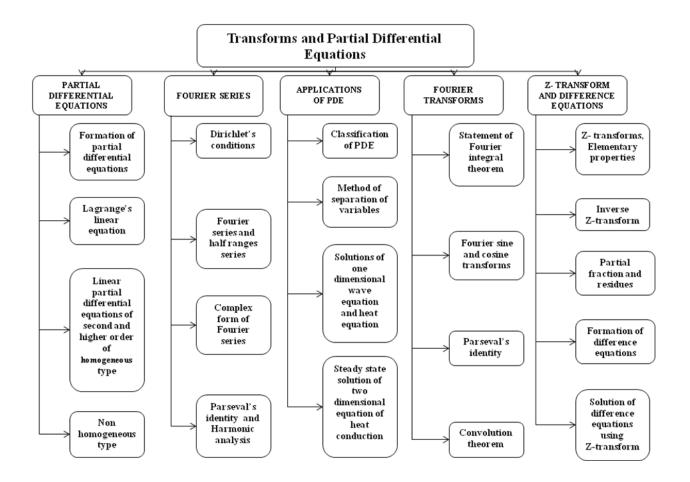
The aim of this course is to develop an understanding of Fourier series analysis which is central to many applications in engineering. The syllabus is designed to study and understand the behavior of transforms such as Fourier Transform and Z Transform which are widely used in Signal Processing. The course provides effective mathematical tools for the solution of partial differential equations that model several physical processes.

Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO2	Evaluate the Fourier series for standard periodic waveforms.	Evaluate
CO3	Evaluate the solutions of wave and heat equations using Fourier series.	Evaluate
CO4	Understand the properties and techniques of Fourier transforms.	Understand
CO5	Find Z transform of elementary functions and apply the necessary Z transform techniques to solve the difference equations.	Apply

	BIO MED														
Course Outcomes		Program Outcomes Outcomes Outcomes													
Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	2	3	2
CO2	3	2	2	-	1	-	-	-	-	-	-	-	2	3	2
CO3	3	3	3	2	-	-	-	-	-	-	-	1	2	3	2
CO4	3	2	2	-	1	-	-	-	-	-	-	-	3	1	2
CO5	3	2	3	2	-	-	-	-	-	-	-	1	3	1	2



SYLLABUS

UNIT I	PARTIAL DIFFERENTIAL EQUATIONS	12
	partial differential equations - Singular integrals Solutions of standard ty	
	ntial equations – Lagrange's linear equation Linear partial differential equ	
and higher ord	ler with constant coefficients of both homogeneous and non-homogeneous t	ypes
UNIT II	FOURIER SERIES	12
	nditions - General Fourier series - Odd and even functions - Half range s	
range cosine s	eries - Complex form of Fourier series - Parseval's identity - Harmonic an	alysis
UNIT III	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12
equation – On equation of he	of PDE – Method of separation of variables - Solutions of one dime the dimensional equation of heat conduction – Steady state solution of two at conduction (excluding insulated edges).	o dimensional
UNIT IV	FOURIER TRANSFORMS	12
Properties – Tr	Fourier integral theorem – Fourier transform pair – Fourier sine and cost ransforms of simple functions – Convolution theorem – Parseval's identity	
UNIT V	 Z TRANSFORMS AND DIFFERENCE EQUATIONS Elementary properties – Inverse Z - transform (using partial fraction 	12
transform	heorem - Formation of difference equations – Solution of difference equations	L: 60 PERIODS
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REFERENCI		
	I.P and Manish Goyal, "A Textbook of Engineering Mathematics", 7 th rations PvtLtd , 2007.	Edition, Laxmi
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3) Glyn 2007.	James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pea	rson Education,
5) Ray V	Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley India, Wylie. C and Barrett.L.C, "Advanced Engineering Mathematics" Sixt aw Hill Education Pvt Ltd, New Delhi, 2012	
Course Desig 1.	gners: Dr.Kalyanasundaram.M <u>kalyanasundaram@saveetha.ac.in</u>	

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(COMMON TO ECE, BIO-MED & MED-ELEC)

Preamble :

This course is designed to cover the concepts of probability distributions, random processes and spectral densities for applications such as random signals, digital signal processing etc in communication engineering. The syllabus also covers the techniques of hypothesis testing for small and large samples which plays an important role in real life problems.

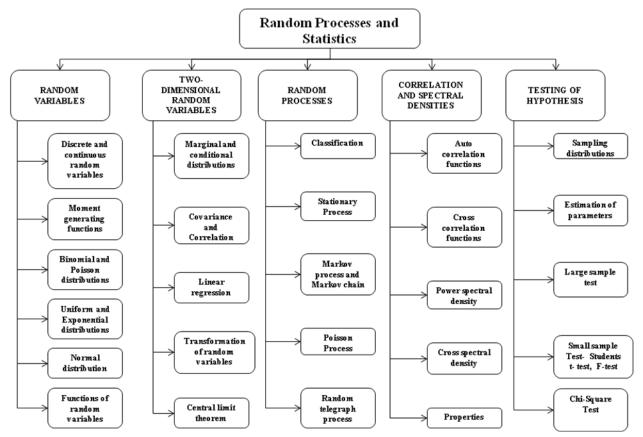
Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO2	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	Apply
CO3	Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	Analyze
CO4	Evaluate functional relationship between random inputs and outputs with the use of Random Process Techniques.	Evaluate
CO5	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply

							BIO	MED)							
Course Outcomes		Program Outcomes Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	2	2	
CO2	3	2	-	-	-	-	-	-	-	-	-	1	3	2	2	
CO3	3	2	-	-	-	-	-	-	-	-	-	1	3	2	2	
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	1	2	
CO5	3	2	1	1	2	1	-	-	-	-	-	2	3	1	2	

3-Strong; 2-Medium; 1-Low



L T PC 3 1 0 4

SYLLABUS

UNIT I	RANDOM VARIABLES	12
	bles - Discrete and continuous random variables – Moments – Moment ger	
– ыпоппат, г variables.	Poisson, Geometric, Uniform, Exponential and Normal distributions- Fun	ictions of random
UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12
	ions – Marginal and conditional distributions – Covariance – Correlation an	
	ransformation of random variables – Central limit theorem (for independen	
	ndom variables).	2
UNIT III	RANDOM PROCESSES	12
Classification	- Stationary process - Markov process - Markov chain - Poisson pr	ocess – Randon
telegraph proc	cess.	
UNIT IV	CORRELATION AND SPECTRAL DENSITIES	12
Auto correlati	on functions - Cross correlation functions - Properties - Power spectral der	nsity –Cross
spectral densit	y – Properties.	
UNIT V	TESTING OF HYPOTHESIS	12
Sampling dist Normal distri	ributions – Estimation of parameters – Statistical hypothesis - Large same bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In	F distributions for
Sampling dist Normal distri testing means,	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA	F distributions fo
Sampling dist Normal distri testing means, TEXT BOOF 1. Peebles	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA XS: b. P.Z., "Probability, Random Variables and Random Signal Principles", Tata	distributions for dependency)
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Sampling dist Normal distri testing means, TEXT BOOH 1. Peebles 4th Ec 2. Ibe.O.C Reprin 3. Johnso Engin REFERENC	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA XS: A. P.Z., "Probability, Random Variables and Random Signal Principles", Tata dition, New Delhi, 2002. C., "Fundamentals of Applied Probability and Random Processes", Elsevier, nt, 2007. on, R.A., Miller, I and Freund J., "Miller and Freund's Probability a eers", Pearson Education, Asia, 8 th Edition, 2015. ES :	distributions for dependency) L: 60 PERIOD Mc Graw Hill, 1st Indian and Statistics for
Sampling dist Normal distri- testing means, TEXT BOOH 1. Peebles 4th Ed 2. Ibe.O.C Repri- 3. Johnsc Engin REFERENC 1. Yates	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA XS: , "Probability, Random Variables and Random Signal Principles", Tata dition, New Delhi, 2002. , "Fundamentals of Applied Probability and Random Processes", Elsevier, nt, 2007. on, R.A., Miller, I and Freund J., "Miller and Freund's Probability a eers", Pearson Education, Asia, 8 th Edition, 2015.	distributions for dependency) AL: 60 PERIOD Mc Graw Hill, 1st Indian and Statistics for
Sampling dist Normal distri testing means. TEXT BOOH 1. Peebles 4th Ea 2. Ibe.O.C Reprin 3. Johnson Engin REFERENC 1. Yates. Pvt. L 2. Miller	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA XS: . P.Z., "Probability, Random Variables and Random Signal Principles", Tata dition, New Delhi, 2002. C., "Fundamentals of Applied Probability and Random Processes", Elsevier, nt, 2007. on, R.A., Miller, I and Freund J., "Miller and Freund's Probability a eers", Pearson Education, Asia, 8 th Edition, 2015. ES : R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Ed	distributions for dependency) AL: 60 PERIOD Mc Graw Hill, 1st Indian and Statistics for ition, Wiley Indi
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Sampling dist Normal distri testing means, TEXT BOOH 1. Peebles 4th Ed 2. Ibe.O.C Repri 3. Johnso Engin REFERENC 1. Yates. Pvt. L 2. Millen Proce 3. Hwei Rando 4. Coope	bution for single mean and difference of means - Tests based on t and H variances and proportion – Chi-square test- Contingency table (Test for In TOTA XS: . P.Z., "Probability, Random Variables and Random Signal Principles", Tata dition, New Delhi, 2002. C., "Fundamentals of Applied Probability and Random Processes", Elsevier, nt, 2007. on, R.A., Miller, I and Freund J., "Miller and Freund's Probability a eers", Pearson Education, Asia, 8 th Edition, 2015. ES : R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Ed td., Bangalore, 2012. : S.L. and Childers. D.G., "Probability and Random Processes with Appl ssing and Communications", Academic Press, 2004. Hsu, "Schaum"s Outline of Theory and Problems of Probability, Rando	distributions for dependency) AL: 60 PERIOD Mc Graw Hill, 1st Indian and Statistics for ition, Wiley Indi ications to Signatom Variables an

Course Designers:

- 1. Ms. K. Ruth Isabels <u>ruthisabels@saveetha.ac.in</u>
- 2. Ms. V. Kavitha <u>kavithav@saveetha.ac.in</u>



Department of Civil Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra*	BS	3	1	0	4	2-2	-
2	19MA205	Differential Equations and Laplace Transforms*	BS	3	1	0	4	2-2	19MA201
3	19MA211	Statistics and Numerical Methods	BS	3	0	2	4	2-1-2	19MA201 • Theory C- 2 • Practical C – 1 • No Observation • Only record

Note:

*Exempted for Lateral Entry Students

19MA201	Calculus and Matrix Algebra	LTPC
19MA201	C C	3 1 0 4

(COMMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

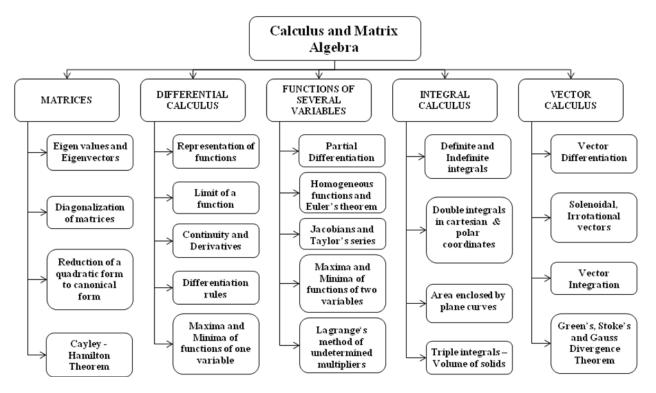
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

								CIV	IL					
Course Outcomes					P	Program	m Outo	comes					Program Spec	ific Outcomes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2
CO2	3	2	2	1	-	-	-	-	-	-	-	1	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	1	3	1
CO4	3	3	1	-	-	-	-	-	-	-	-	-	2	3
CO5	3	2	2	1	-	-	-	-	-	-	-	-	3	2



SYLLABUS

UNIT I	MATRICES	12			
and Eigenvect	and Eigenvectors of a real matrix – Characteristic equation – Properties of ors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	•			
UNIT II	DIFFERENTIAL CALCULUS	12			
1	n of functions - Limit of a function - Continuity - Derivatives - Differ Ainima of functions of one variable.	entiation rules -			
UNIT III	NIT III FUNCTIONS OF SEVERAL VARIABLES 1				
variables – Jac	ntiation – Homogeneous functions and Euler's theorem – Total derivati cobians – Taylor's series for functions of two variables – Maxima and min es – Lagrange's method of undetermined multipliers.				
UNIT IV	INTEGRAL CALCULUS	12			
	Indefinite integrals - Double integrals – Double integrals in polar coo ane curves – Triple integrals – Volume of solids.	rdinates – Area			
UNIT V	VECTOR CALCULUS	12			
integration –	rgence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' the ole applications involving cubes and rectangular parallelepipeds.	orem (excluding			
		L: 60 PERIODS			
2015. 2) James Ste	S: .S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10t	lew Delhi, 2015.			
REFERENCI		in eartion, 2013			
 Anton, H Jain R.K Delhi, 5t 	, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publicat h Edition, 2016.				
Publisher	n, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Visw s Pvt. Ltd., Chennai, 2009.				
,	a Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Press, an.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, NewDo				

Course Designers:

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2 Ms. P. S. Narmathadevi <u>narmathadevi@saveetha.ac.in</u>

19MA205	Differential Equations and Lonloss Transforms	LTPC
19MA205	Differential Equations and Laplace Transforms	3 1 0 4
	(COMMON TO CHEMICAL, CIVIL & MECHANICAL)	

Preamble :

This course is designed to cover topics such as Fourier series, Differential equations and Laplace Transforms. The syllabus includes various techniques to solve differential equations which are essential to handle practical problems arising in the field of engineering. Fourier series are widely used in signal analysis to find strength and vibrations of buildings. The course includes Laplace transforms in which various methods can be used to transform the time domain functions to frequency domain.

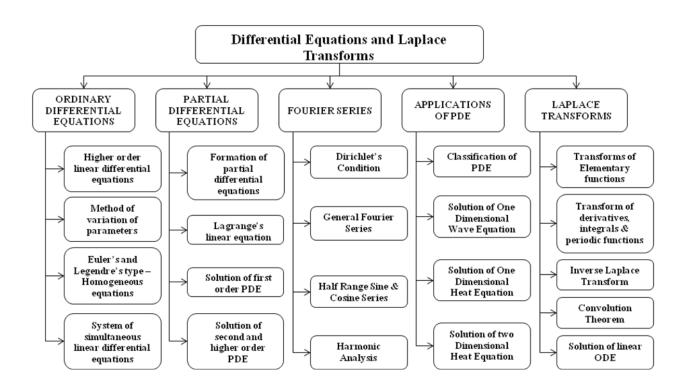
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Analyze the suitable techniques for solving second and higher order differential equations.	Analyze
CO2	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO3	Evaluate the Fourier series for standard periodic waveforms.	Evaluate
CO4	Apply the Fourier series techniques to solve wave and heat equations.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

							CI	VIL						
Course Outcomes					I	Program	m Outo	omes					Progran Outo	n Specific comes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	1	-	-	-	-	-	-	-	1	3	3
CO2	3	3	2	2	-	-	-	-	-	-	-	1	2	1
CO3	3	2	3	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	2	-	-	-	-	-	-	-	-	2	2
CO5	3	3	2	1	-	-	-	-	-	-	-	-	2	2

3 – Strong; 2 – Medium; 1-Low



L T PC 3 1 0 4

SYLLABUS

UNIT I	ORDINARY DIFFERENTIAL EQUATIONS	12
	near differential equations with constant coefficients - Method of variation	
Homogenous equ	ation of Euler's and Legendre's type - System of simultaneous linear diffe	rential equations wit
constant coefficie	ents - Method of undetermined coefficients	
UNIT II	PARTIAL DIFFERENTIAL EQUATIONS	12
differential equat	tial differential equations – Singular integrals Solutions of standard type tions – Lagrange's linear equation Linear partial differential equations nt coefficients of both homogeneous and Non-homogeneous types.	
UNIT III	FOURIER SERIES	12
Dirichlet's condi cosine series-Har	tions – General Fourier series – Odd and even functions – Half range sin monic Analysis.	e series – Half rang
UNIT IV	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12
dimensional equa	PDE – Method of separation of variables - Solutions of one dimensional wave ation of heat conduction – Steady state solution of two dimensional equation of tod edges)	
(excluding insula	ted edges).	
UNIT V Existence conditi integrals – Initial Theorem - Appli	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with elementary differential equations with elementary differential equations with elementary functions.	ons – Convolution constant
UNIT V Existence conditi integrals – Initial Theorem - Appli coefficients. TEXT BOOKS:	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with the second order orde	derivatives and ons – Convolution constant OTAL: 60 PERIOD
UNIT V Existence conditi integrals – Initial Theorem - Appli coefficients. TEXT BOOKS: 1) Grewal F	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with the second order orde	derivatives and ons – Convolution constant DTAL: 60 PERIOD rd Edition, 2014.
UNIT V Existence conditi integrals – Initial Theorem - Appli coefficients. TEXT BOOKS: 1) Grewal E 2) Kreyszig	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with a second order ordinary differential equations with a second sec	derivatives and ons – Convolution constant DTAL: 60 PERIOD rd Edition, 2014.
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UNIT V Existence conditi integrals – Initial Theorem - Appli coefficients. TEXT BOOKS: 1) Grewal F 2) Kreyszig 2016. REFERENCES 1) Bali N., 0 Lakshmi 2) Jain R.K	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with a second order ordinary differential equations with a second	derivatives and ons – Convolution constant DTAL: 60 PERIOD rd Edition, 2014. Edition, New Delhi, Media (An imprint of
UNIT V Existence conditi integrals – Initial Theorem - Appli coefficients. TEXT BOOKS: 1) Grewal E 2) Kreyszig 2016. REFERENCES 1) Bali N., G Lakshmi 2) Jain R.K 3rd Editi	LAPLACE TRANSFORMS ons – Transforms of elementary functions – Basic properties –Transforms of and final value theorems – Inverse transforms –Transform of periodic function to solution of linear second order ordinary differential equations with the second order orde	derivatives and ons – Convolution constant DTAL: 60 PERIOD rd Edition, 2014. Edition, New Delhi, Media (An imprint of cations, New Delhi ,
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1.	Ms. N. Jegajothi	jegajothi@saveetha.ac.in
2.	Ms. P. S. Narmathadevi	narmathadevi@saveetha.ac.in

L T PC 3 0 2 4

(COMMON TO CIVIL & MECHANICAL)

Preamble:

The goal of the course is to provide a sound knowledge in testing of hypothesis for small and large samples which plays an important role in real time engineering problems. The syllabus deals with the basic concepts of design of experiments which are essential in the field of agriculture and statistical quality control. This course aims to impart knowledge in Numerical methods for solution of system of equations, interpolation, differentiation and integration. The syllabus also provides the solution for some of these methods using PYTHON techniques.

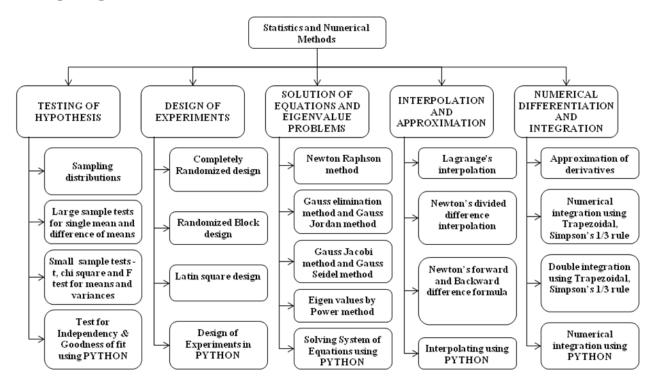
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.	Apply
CO3	Obtain solutions of algebraic and transcendental equations and solve linear system of equations using suitable numerical methods.	Understand
CO4	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply
CO5	Evaluate derivatives and integrals using Numerical techniques.	Evaluate

							CI	VIL							
Course Outcomes		Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	3	1	-	-	-	-	-	-	-	1	3	3	
CO2	3	3	2	1	-	-	-	-	-	-	-	1	3	3	
CO3	3	3	2	-	-	-	-	-	-	-	-	1	3	2	
CO4	3	3	3	1	-	-	-	-	-	-	-	1	3	2	
CO5	3	2	1	1	-	-	-	-	-	-	-	-	3	2	

3 - Strong; 2 - Medium; 1-Low



L T P C 3 0 2 4

SYLLABUS

UNIT I	TESTING OF HYPOTHESIS	12
distribution for	butions – Estimation of parameters – Statistical hypothesis - Large sample test single mean and difference of means - Tests based on t, chi square and F distril e - Contingency table (Test for Independency)-Goodness of fit. Testing of small s ng Python.	butions for testing
UNIT II	DESIGN OF EXPERIMENTS	12
	wo way classifications - Completely randomized design – Randomized block desi way and two way classifications using Python.	ign – Latin square
UNIT III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	12
equations - Gau Gauss Seidel -	gebraic and transcendental equations – Newton Raphson method. Solution of uss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power Gauss Seidal method using Python.	Gauss Jacobi and
UNIT IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND INTEGRATION	12
interpolation -	d Newton's divided difference interpolation – Newton's forward and bac Approximation of derivatives using interpolation polynomials - Numerical mpson's rule. Interpolation and Numerical Integration using Python.	
UNIT V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL	12
Taylor's series	EQUATIONS method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta	method for
solving first and		
solving first and equations . Rur	method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta d second order equations – Adams Bashforth's predictor – corrector methods for sol nge-Kutta and Adams Bashforth' method using Python. TOTA	
solving first and equations . Run TEXT BOOKS 1) Grewa 45th E 2) Gerald New E 3) Gupta, Sons, I 4) Kent	method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta d second order equations – Adams Bashforth's predictor – corrector methods for sol nge-Kutta and Adams Bashforth' method using Python. TOTA	lving first order AL: 75 PERIODS Publishers, sia,7 th Edition,
solving first and equations . Rur TEXT BOOKS 1) Grewa 45th E 2) Gerald New E 3) Gupta, Sons, I 4) Kent DOI 14 REFERENCE 1. Statisti 2. Sankar 3. Gerald Delhi, 4. Jaan I Edinbu 5. José	method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta d second order equations – Adams Bashforth's predictor – corrector methods for sol nge-Kutta and Adams Bashforth' method using Python . TOT A S: 1. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna dition, New Delhi, 2017. 1. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, As Delhi, 2009 , S.C, and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed) New Delhi. D. Lee. (2014). Python Programming Fundamentals (2nd 0.1007/978-1-4471-6642-9 S : ics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. raRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India I. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, As 2006. Kiusalaas., Numerical Methods in Engineering with Python, Cambridge Univ 19th Building, Cambridge, UK., 2005	AL: 75 PERIO AL: 75 PERIO Publishers, Sia,7 th Edition,),Sultan Chand Ed), Spring a,6 th Edition, N

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- 2. Mr.K.Thirumalai <u>thirumalai@saveetha.ac.in</u>



Department of Chemical Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra*	BS	3	1	0	4	2-2	-
2	19MA205	Differential Equations and Laplace Transforms*	BS	3	1	0	4	2-2	19MA201
3	19MA209	Numerical Methods	BS	3	1	0	4	2-2	19MA201

Note:

*Exempted for Lateral Entry Students

19MA201	Calculus and Matrix Algebra	LTPC
19MA201	Ŭ	3 1 0 4

(COMMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

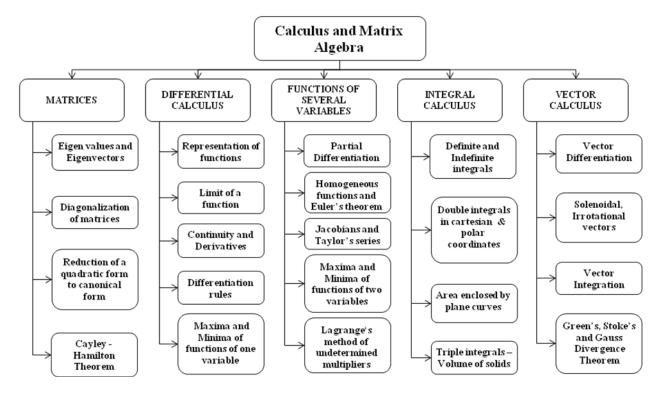
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

	CHEMICAL															
Course Outcomes		Program Outcomes Program Specific Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	2	2	1	-	-	-	-	-	-	-	1	1	2	3	
CO2	3	2	2	1	-	-	-	-	-	-	-	1	3	3	-	
CO3	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2	
CO4	3	3	1	-	-	-	-	-	-	-	-	-	2	3	2	
CO5	3	2	2	1	-	-	-	-	-	-	-	-	1	2	2	



SYLLABUS

UNIT I	MATRICES	12
and Eigenvect	and Eigenvectors of a real matrix – Characteristic equation – Properties o tors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	U
UNIT II	DIFFERENTIAL CALCULUS	12
	n of functions - Limit of a function - Continuity - Derivatives - Diffe Minima of functions of one variable.	rentiation rules
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
variables - Ja	entiation – Homogeneous functions and Euler's theorem – Total derivat cobians – Taylor's series for functions of two variables – Maxima and min es – Lagrange's method of undetermined multipliers.	
UNIT IV	INTEGRAL CALCULUS	12
	Indefinite integrals - Double integrals – Double integrals in polar cool lane curves – Triple integrals – Volume of solids.	ordinates – Area
Gradient, dive integration –	VECTOR CALCULUS ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the	
integration – proofs) – Sim	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA	tor fields –Vector
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal E	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA	tor fields –Vecto eorem (excluding
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal F 2015.	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA KS: B.S., —Higher Engineering Mathematics ^I , Khanna Publishers, New Delhi, 4	tor fields –Vecto eorem (excluding L: 60 PERIODS 43rd Edition,
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal H 2015. 2) James St	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA KS: B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N	tor fields –Vecto eorem (excluding L: 60 PERIODS 43rd Edition, New Delhi, 2015
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal F 2015. 2) James St 3) Kreyszig	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA CS: B.S., —Higher Engineering Mathematics , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10	For fields –Vecto eorem (excluding L: 60 PERIODS 43rd Edition, New Delhi, 2015
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal H 2015. 2) James St 3) Kreyszig REFERENC	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA CS: B.S., —Higher Engineering Mathematics , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10	For fields –Vecto eorem (excluding L: 60 PERIODS 43rd Edition, New Delhi, 2015
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal F 2015. 2) James St 3) Kreyszig REFERENC 1) Anton, F 2) Jain R.K	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA KS: B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10 ES :	For fields –Vecto eorem (excluding L: 60 PERIODS 43rd Edition, New Delhi, 2015 th edition, 2015
Gradient, dive integration – proofs) – Sim TEXT BOOH 1) Grewal H 2015. 2) James St 3) Kreyszig REFERENC 1) Anton, H 2) Jain R.K Delhi, 5t 3) Narayan	ergence and curl – Directional derivative – Irrotational and solenoidal vect Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds. TOTA KS: B.S., —Higher Engineering Mathematics , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10 ES : I, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publica	tions, New

Course Designers:

1	Ms. N. Jegajothi	jegajothi@saveetha.ac.in

2 Ms. P. S. Narmathadevi <u>narmathadevi@saveetha.ac.in</u>

(COMMON TO CHEMICAL, CIVIL & MECHANICAL)

Preamble :

This course is designed to cover topics such as Fourier Series, Differential equations and Laplace Transforms. The syllabus includes various techniques to solve differential equations which are essential to handle practical problems arising in the field of engineering. Fourier Series are widely used in signal analysis to find strength and vibrations of buildings. The course includes Laplace transforms in which various methods can be used to transform the time domain functions to frequency domain.

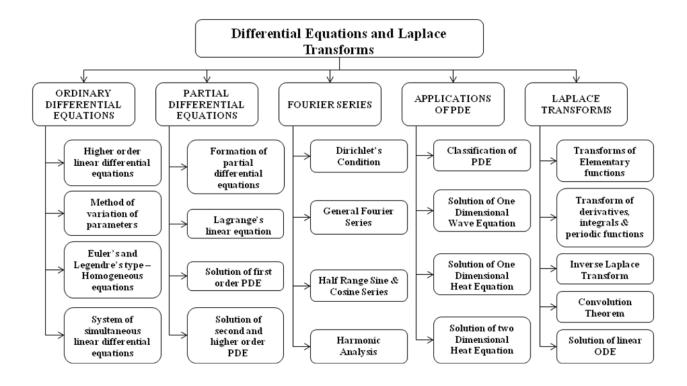
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Analyze the suitable techniques for solving second and higher order differential equations.	Analyze
CO2	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO3	Evaluate the Fourier series for standard periodic waveforms.	Evaluate
CO4	Apply the Fourier series techniques to solve wave and heat equations.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

	CHEMICAL															
Course Outcomes		Program OutcomesProgram SpecificOutcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	2	3	2	1	-	-	-	-	-	-	-	1	3	1	2	
CO2	3	3	2	2	-	-	-	-	-	-	-	1	2	3	-	
CO3	3	2	3	1	-	-	-	-	-	-	-	-	3	2	-	
CO4	3	3	2	2	-	-	-	-	-	-	-	-	2	1	3	
CO5	3	3	2	1	-	-	-	-	-	-	-	-	2	2	-	

3 – Strong; 2 – Medium; 1-Low



L T PC 3 1 0 4

SYLLABUS

UNIT I	ORDINARY DIFFERENTIAL EQUATIONS	12
	rder linear differential equations with constant coefficients - Method of variation	
	nous equation of Euler's and Legendre's type - System of simultaneous li	near differential
equations	s with constant coefficients - Method of undetermined coefficients	
UNIT II	PARTIAL DIFFERENTIAL EQUATIONS	12
partial di	on of partial differential equations – Singular integrals Solutions of standard ty ifferential equations – Lagrange's linear equation Linear partial differential equer order with constant coefficients of both homogeneous and Non-homogeneous	ations of second
UNIT II	I FOURIER SERIES	12
	c's conditions – General Fourier series – Odd and even functions – Half range s sine series-Harmonic Analysis.	ine series – Half
UNIT IV	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12
equation equation	ation of PDE – Method of separation of variables - Solutions of one dimensional – One dimensional equation of heat conduction – Steady state solution of two di of heat conduction (excluding insulated edges).	
UNIT V	LAPLACE TRANSFORMS	12
Existence derivative functions	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms –Transfor s – Convolution Theorem - Application to solution of linear second order ordina	m of periodic
Existence derivative functions differenti TEXT B	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms – Transfor s – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAI	rm of periodic rry L: 60 PERIODS
Existence derivative functions differenti TEXT B 1) C	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms –Transfor s – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAL BOOKS: Grewal B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delh 2014.	rm of periodic rry L : 60 PERIODS i, 43rd Edition,
Existence derivative functions differenti TEXT B 1) (2 2) k	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms –Transfor s – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAI GOOKS: Grewal B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delh	rm of periodic rry L : 60 PERIODS i, 43rd Edition,
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Existence derivative functions differenti TEXT B 1) C 2) K N REFERI 1) E in 2) J	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms – Transfor s – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAI SOOKS: Grewal B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delh 2014. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10 New Delhi, 2016. ENCES : Bali N., Goyal M. and Watkins C., —Advanced Engineering Mathematics, Firev	rm of periodic rry L: 60 PERIODS i, 43rd Edition, 0th Edition, vall Media (An
Existence derivative functions differenti 1) C 2) K N REFERI 1) E in 2) J N 3) C	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms – Transfor s – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAL BOOKS: Grewal B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delh 2014. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10 New Delhi, 2016. ENCES : Bali N., Goyal M. and Watkins C., —Advanced Engineering Mathematics ^{II} , Firev Imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009. Jain R.K. and Iyengar S.R.K., — Advanced Engineering Mathematics I, Narosa F	rm of periodic ry L: 60 PERIODS i, 43rd Edition, 0th Edition, 0th Edition, vall Media (An Publications,
Existence derivative functions differenti TEXT B 1) C 2) K N REFERI 1) E in 2) J 3) C E 4) S	e conditions – Transforms of elementary functions – Basic properties –Transform res and integrals – Initial and final value theorems – Inverse transforms –Transfor is – Convolution Theorem - Application to solution of linear second order ordina ial equations with constant coefficients. TOTAL GOOKS: Grewal B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delh 2014. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10 New Delhi, 2016. ENCES : Bali N., Goyal M. and Watkins C., —Advanced Engineering Mathematics ^{II} , Firev Imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009. Jain R.K. and Iyengar S.R.K., — Advanced Engineering Mathematics I, Narosa F New Delhi , 3rd Edition, 2007. D'Neil, P.V. —Advanced Engineering Mathematics, Cengage Learning India Pv	rm of periodic ry L: 60 PERIODS i, 43rd Edition, Oth Edition, Oth Edition, vall Media (An Publications, rt., Ltd, New

8	
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19MA209	Numerical Methods	L T P C
		3 1 0 4

(Only for CHEMICAL)

Preamble :

The course is designed to acquaint the students about various techniques of Numerical Analysis such as solution of linear system of equations, interpolation and approximation, numerical differentiation and integration, numerical solution of differential equations

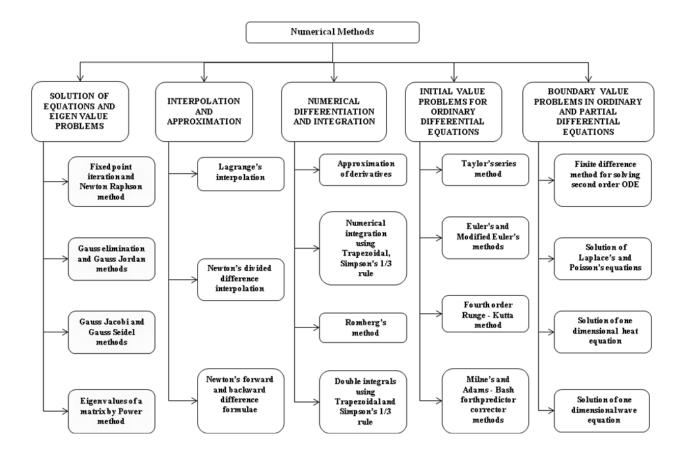
Prerequisite :

19MA201 - Calculus and Matrix Algebra

CO1	Obtain solutions of algebraic and transcendental equations and solve linear system of equations using suitable numerical methods.	Understand
CO2	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply
CO3	Evaluate derivatives and integrals using Numerical techniques.	Evaluate
CO4	Apply the appropriate numerical methods in finding approximate solutions to ordinary differential equations.	Apply
CO5	Evaluate the solutions of partial differential equations using finite difference approximations.	Evaluate

						(CHEN	ЛІСА	L						
Course Outcomes		Program Outcomes Program Specific Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	1	1	3	3
CO2	3	3	3	2	-	-	-	-	-	-	-	1	3	1	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1	3	1	2
CO4	3	2	3	2	-	-	-	-	-	-	-	1	2	3	-
CO5	3	3	2	1	-	-	-	-	-	-	-	1	2	2	-

3 – Strong; 2 – Medium; 1-Low



SYLLABUS

UNIT I	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	12
method - Solut	ebraic and transcendental equations - Fixed point iteration method – Newto ion of linear system of equations - Gauss elimination method – Pivoting - C tive methods of Gauss Jacobi and Gauss Seidel – Eigen values of a matrix b	Gauss Jordan
UNIT II	INTERPOLATION AND APPROXIMATION	12
•	vith unequal intervals - Lagrange's interpolation – Newton's divided differe Interpolation with equal intervals -Newton's forward and backward different	
UNIT III	NUMERICAL DIFFERENTIATION AND INTEGRATION	12
· ·	n of derivatives using interpolation polynomials - Numerical integration using impson's 1/3 rule – Romberg's Method - Evaluation of double integrals by rules.	•
UNIT IV	INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS	12
Runge - Kutta	thods - Taylor's series method - Euler's method - Modified Euler's method method for solving first order equations - Multi step methods - Milne's and corrector methods for solving first order equations.	
UNIT V	BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS	12
difference tech rectangular dor	ce methods for solving second order two - point linear boundary value prob iniques for the solution of two dimensional Laplace's and Poisson's equatio main – One dimensional heat flow equation by explicit and implicit (Crank e dimensional wave equation by explicit method.	ns on Nicholson)
	TOTAI	L: 60 PERIODS
2) Grewal,	S: R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Publishers, 10th Edition, New Delhi, 2015.	g, 2016.
Edition, N 2) Brian B Delhi, 200 3) Sankara 3rd Edition	C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Educati ew Delhi, 2006 radie. "A friendly introduction to Numerical analysis", Pearson Education,	Asia, New of India Private,
New Delhi Course Desig	i, 2007.	,- · · · · ,
	Dr. J. Joy Priscilla joypriscilla@saveetha.ac.in	
2.	Dr.A.Mahalakshmi mahalakshmia <u>@saveetha.ac.in</u>	



Department of Computer Science Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra*	BS	3	1	0	4	2-2	-
2	19MA206	Logic and Combinatorics*	BS	3	1	0	4	2-2	19MA201
3	19MA212	Algebra and Number Theory	BS	3	1	0	4	2-2	19MA201
4	19MA218	Probability and Queueing Theory	BS	3	1	0	4	2-2	19MA201

Note:

*Exempted for Lateral Entry Students

19MA201	Calculus and Matrix Algebra	LTPC
19MA201		3 1 0 4
(CO	MMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

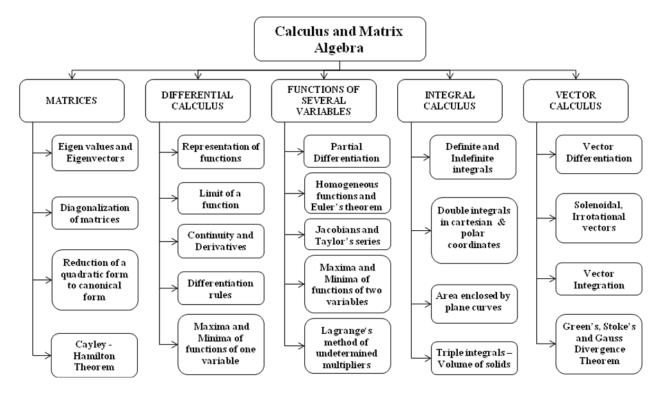
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

								CS	E						
Course Outcomes					I	Program	m Out	comes					Progra	am Specific	Outcomes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	1	2
CO2	3	2	2	1	-	-	-	-	-	-	-	1	2	1	1
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	1
CO4	3	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	1	1	1



SYLLABUS

UNIT I	MATRICES	12
and Eigenvec	and Eigenvectors of a real matrix – Characteristic equation – Properties of tors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	•
UNIT II	DIFFERENTIAL CALCULUS	12
*	n of functions - Limit of a function - Continuity - Derivatives - Differ Minima of functions of one variable.	entiation rules -
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
variables – Ja	entiation – Homogeneous functions and Euler's theorem – Total derivati cobians – Taylor's series for functions of two variables – Maxima and min es – Lagrange's method of undetermined multipliers.	0
UNIT IV	INTEGRAL CALCULUS	12
	Indefinite integrals - Double integrals – Double integrals in polar coo lane curves – Triple integrals – Volume of solids.	rdinates – Area
UNIT V	VECTOR CALCULUS	12
integration -	ergence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem ple applications involving cubes and rectangular parallelepipeds.	orem (excluding
		L: 60 PERIODS
TEXT BOOI 1) Grewal H 2015.	S: B.S., —Higher Engineering Mathematics∥, Khanna Publishers, New Delhi, 4.	3rd Edition,
<i>,</i>	ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10t	
REFERENC	ES :	
1) Anton, H	I, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016.	
,	. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publicati h Edition, 2016.	ons, New
	an, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Visw rs Pvt. Ltd., Chennai, 2009.	ranathan
4) Srimantl	ha Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Press,	2015.
5) Veeraraj 2013.	an.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, NewDe	elhi, 5th edition,

Course Designers:

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 Ms. P. S. Narmathadevi

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(COMMON to CSE & IT)

Preamble :

This course covers the mathematical topics most directly related to computer science. Topics includes: logic, count ability and counting arguments, proof techniques. Software engineering uses graphs, trees and other data structures. Logic is used in AI research in theorem proving and in database query systems.

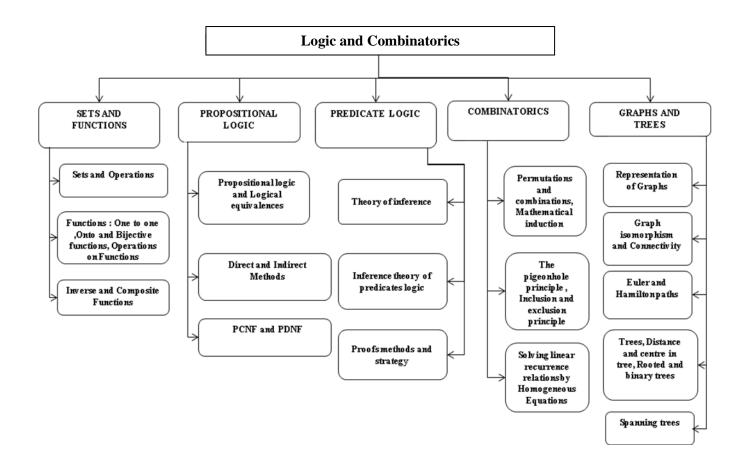
Prerequisite:

19MA201- Calculus and Matrix Algebra

CO1	Construct the class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	Understand
CO2	To extend student's logical and mathematical maturity and ability to deal with abstraction.	Analyze
CO3	Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.	Evaluate
CO4	Construct the recurrence relation for a given engineering problems and solve the recurrence equation.	Apply
CO5	Demonstrate different traversal methods for trees and graphs.	Understand

								CSE]						
Course Outcomes					Р	rograi	n Outo	comes					Progra	am Specific (Outcomes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	-	1	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	-	-	1	1
CO3	3	3	2	2	-	-	-	-	-	-	-	-	2	1	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	-	2
CO5	3	3	2	1	-	-	-	-	-	-	-	-	-	2	-

3 – Strong; 2 – Medium; 1-Low



SYLLABUS

UNIT I	SETS AND FUNCTIONS	12
	ations — Proofs of set identities — Relations — Equivalence relations –Fur	
one, onto and	bijective functions, operations on functions : Inverse and composite Function	ons.
UNIT II	PROPOSITIONAL LOGIC	12
	logic – Arguments – Logical laws – Logical equivalences – Direct and Indir DNF (Using Truth tables and Laws).	rect Methods-
UNIT III	PREDICATE LOGIC	12
	erence – Quantifiers— Predicate formulas—Inference theory of predicates less strategy—Direct method of proofs and Indirect method of proofs.	ogic. Proofs
UNIT IV	COMBINATORICS	12
principle —	nciples — Permutations and combinations — Mathematical induction – The Inclusion and exclusion principle — Recurrence relations – Solving linear re- enerating functions (Homogeneous Equations).	
UNIT V	GRAPHS AND TREES	12
and Hamiltor	rties of trees-Distance and centre in tree-Rooted and binary trees-Spanning	g trees.
	TOTAL	L: 60 PERIODS
Ltd., Nev 2. Tremblay Science" 3. J.L., Mot	.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw v Delhi, Special Indian Edition, 2011. v, J.P. and Manohar.R, "Discrete Mathematical Structures with Applications , Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011. t, A. Kandel, T.P. Baker, "Discrete Maths for Computer Scientists & Mathem Prentice Hall of India Pvt Limited, New Delhi,2009.	to Computer
REFERENC		
 Lipschu Pub. Co Ralph. F 	tz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata M b. Ltd., New Delhi, 3rd Edition, 2010. C. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introducti Edition, Pearson Education Asia, Delhi, 2006.	
	Koshy, Discrete Mathematics with Applications, Elsevier Publications, 2000	5
4. Seymou McGrav	r Lipschutz and Mark Lipson, Discrete Mathematics, Schaum's Outlines, Ta /-Hill Pub. Co. Ltd., New Delhi, Second edition, 2011.	ta
	ngaravelu and Dr. M. P. Jeyaramam.,"Graph Theory and Applications" First D. Mohapatra Elements of Discrete Mathematics: A Computer Oriented Approx	
Course Des		
1	. Mr. H.Prathab <u>prathab@saveetha.ac.in</u>	

rameshkumar@saveetha.ac.in 53 2. Dr. M. Ramesh Kumar

19MA212	Algebra and Number Theory	LTPC
		3 1 0 4

(COMMON to CSE and IT)

Preamble:

This course gives an integrated approach to number theory and abstract algebra, and provide a firm basis for arithmetic's in computer science field. The concepts of divisibility, prime number, GCD, LCM and modular arithmetic in number theory are used in computer programming. The concept of congruence is used in coding theory and cryptography.

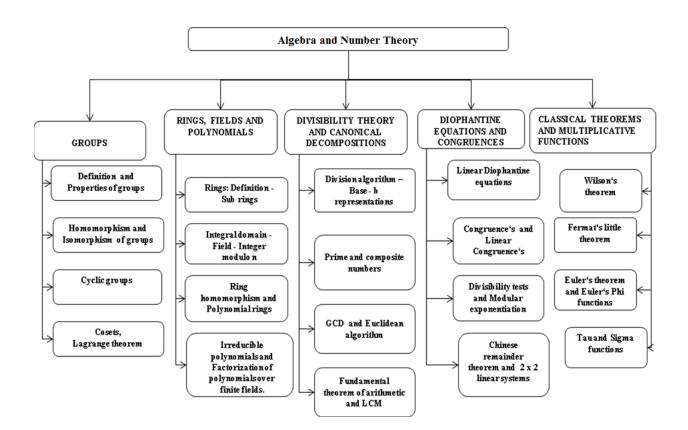
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Apply the basic notions of groups which will then be used to solve related problems	Apply
CO2	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.	Understand
CO3	Demonstrate accurate and efficient use of advanced algebraic techniques.	Evaluate
CO4	Demonstrate their mastery by solving non - trivial problems related to the concepts.	Evaluate
CO5	Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.	Apply

								CSE	C						
Course Outcomes					Р	rograi	n Outo	comes					Progra	am Specifio	e Outcomes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	-	2	2
CO3	3	3	2	1	-	-	-	-	-	-	-	-	-2	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	1	1
CO5	3	3	2	1	-	-	-	-	-	-	-	-	2	-	2

3 – Strong; 2 – Medium; 1-Low



LTPC

3 1 0 4

SYLLABUS

UNIT I	GROUPS	12
Groups : De theorem.	finition - Properties - Homomorphism - Isomorphism - Cyclic groups - (Cosets - Lagrange
UNIT II	RINGS, FIELDS AND POLYNOMIALS	12
Ų	ition - Sub rings - Integral domain - Field - Integer modulo n - Ring ings - Irreducible polynomials over finite fields - Factorization of poly	
UNIT III	DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS	12
•	orithm – Base - b representations –Prime and composite numbers lidean algorithm – Fundamental theorem of arithmetic – LCM.	
UNIT IV	DIOPHANTINE EQUATIONS AND CONGRUENCES	12
	nantine equations – Congruence's – Linear Congruence's - Applications: ponentiation-Chinese remainder theorem – 2×2 linear systems.	Divisibility tests
UNIT V	CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS	12
Wilson's the functions.	orem – Fermat's little theorem – Euler's theorem – Euler's Phi functions -	C
		AL: 60 PERIOD
TEVT DOO	aldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics",	Pearson
Educ	ation, 5th Edition, New Delhi, 2007. y, T., —Elementary Number Theory with Applications, Elsevier Publicat	
 Grim Educ Kosh 	ation, 5th Edition, New Delhi, 2007. y, T., —Elementary Number Theory with Applications, Elsevier Publicat	

Course Designers:

1. Dr. M. Ramesh Kumar

rameshkumar@saveetha.ac.in

19MA218	Probability and Queueing Theory	LTPC
19WIA210		3 1 0 4
	(COMMON to CSE & IT)	

Preamble :

This course is designed to provide necessary basic concepts in probability, standard distributions and random processes which are widely applied in random signals, linear systems in communication engineering and IT fields. The syllabus also covers the concepts of Markovian and advanced queueing models which are essential to design and analyze computer networks.

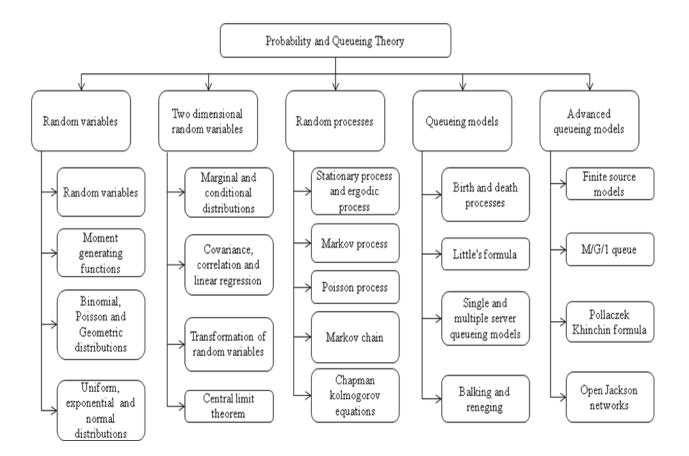
Prerequisite :

19MA201 - Calculus and Matrix Algebra

CO1	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO2	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	Apply
CO3	Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	Analyze
CO4	Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.	Analyze
CO5	Analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.	Analyze

	CSE														
Course Outcomes		Program Outcomes Program Specific Outcome												Outcomes	
	PO 1	PO 2	PO3	PO4	PO 5	PO 6	PO 7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	-	-	-	-	-	-	1	1	1	1
CO2	3	3	2	2	1	-	-	-	-	-	-	-	1	1	1
CO3	3	3	2	2	1	-	-	-	-	-	-	1	2	2	-
CO4	3	3	2	1	1	1	-	-	-	-	-	1	1	1	1
CO5	3	3	2	1	1	-	-	-	-	-	-	1	1	1	1

3 – Strong; 2 – Medium; 1-Low



19MA218	

Probability and Queueing Theory

L	Т	Р	С	
3	1	0	4	

SYLLABUS

UNIT I	RANDOM VARIABLES AND DISTRIBUTIONS	12
	continuous random variables -Functions of a random variable-Moment	
<u> </u>	nctions – Binomial Poisson, Geometric, Uniform, Exponential, and Normal	
UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12
	ions – Marginal and conditional distributions – Covariance – Correlation an Transformation of random variables –Central limit theorem.	d Linear
UNIT III	RANDOM PROCESSES	12
	- Stationary process - Ergodic process - Markov process - Poisson proce arkov chain - Classification of state of a Markov Chain - Chapman	
UNIT IV	QUEUEING MODELS	12
	ueues – Birth and Death processes – Single and multiple server queuei ala - Queues with finite waiting rooms – Queues with impatient customers	
UNIT V	ADVANCED QUEUEING MODELS	12
Linita couroa		
	models - M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/Ek queues – Open Jackson networks.	*
cases – Series	queues – Open Jackson networks. TOTAI	C: 60 PERIOD
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Course Designers:

1. Dr. M. Ramesh Kumar 2. Mr. H. Prathab rameshkumar@saveetha.ac.in prathab@saveetha.ac.in



Department of Electronics and Communication Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA202	Calculus and Laplace Transforms*	BS	3	1	0	4	2-2	-
2	19MA204	Complex Variables and Ordinary Differential Equations*	BS	3	1	0	4	2-2	19MA202
3	19MA213	Linear Algebra and Numerical Methods	BS	3	1	0	4	2-2	19MA202
4	19MA217	Random Processes and Statistics	BS	3	1	0	4	2-2	19MA202

Note:

*Exempted for Lateral Entry Students

(COMMON TO BIO MED, ECE, EEE, EIE & MED ELEC)

Preamble:

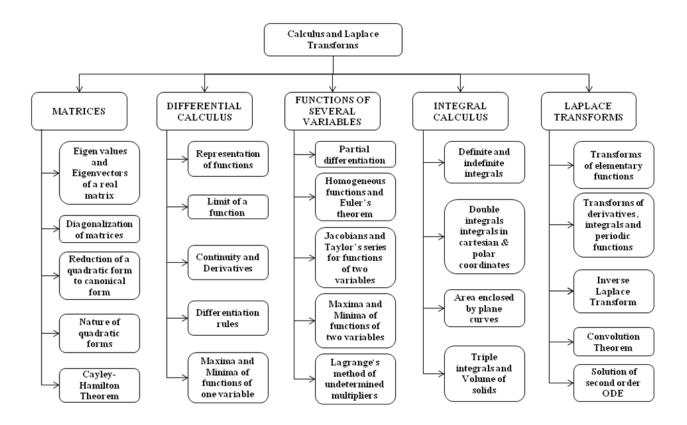
The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines. The syllabus also includes Laplace transforms in which various methods can be used to transform the time domain circuits to frequency domain to simplify the solution of differential equations.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

	ECE														
Course Outcomes		Program Outcomes											Prog (gram Spo Dutcome	ecific s
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	1	3	2	2
CO2	3	3	2	-	-	-	-	-	-	-	-	1	2	1	1
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	-
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	-	2
CO5	2	3	2	1	-	-	-	-	-	-	-	-	3	-	3

3 - Strong; 2 - Medium; 1-Low



SYLLABUS

UNIT I	MATRICES	12
– Cayley-Hami	d Eigenvectors of a real matrix – Characteristic equation – Propert lton theorem – Diagonalization of matrices – Reduction of a quadratic forms.	
UNIT II	DIFFERENTIAL CALCULUS	12
Representation of functions of c	of functions - Limit of a function - Continuity - Derivatives - Difone variable.	ferentiation rules -Maxima and Minim
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
	iation – Homogeneous functions and Euler's theorem – Total derives for functions of two variables – Maxima and minima of function and multipliers.	
UNIT IV	INTEGRAL CALCULUS	12
Definite and In	definite integrals - Double integrals – Double integrals in polar	coordinates - Area enclosed by plan
	integrals – Volume of solid	
curves – Triple		12
curves – Triple UNIT V Existence condi Basic properties transforms – Co	integrals – Volume of solid	ep function and unit impulse function nitial and final value theorems – Invers
curves – Triple UNIT V Existence condi Basic properties transforms – Co	Integrals – Volume of solid LAPLACE TRANSFORMS tions – Transforms of elementary functions – Transform of unit st s – Shifting theorems -Transforms of derivatives and integrals – Ir ponvolution theorem – Transform of periodic functions – Applica	ep function and unit impulse function nitial and final value theorems – Invers
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(COMMON to ECE, BME & MED ELEC)

Preamble:

This course is designed to cover topics such as Vector Calculus, Complex Analysis, Sequences and series. Vector calculus and differential equations can be widely used for modeling the various laws of physics. The syllabus includes concepts of analytic functions which are applied to evaluate Contour Integrals.

Prerequisite:

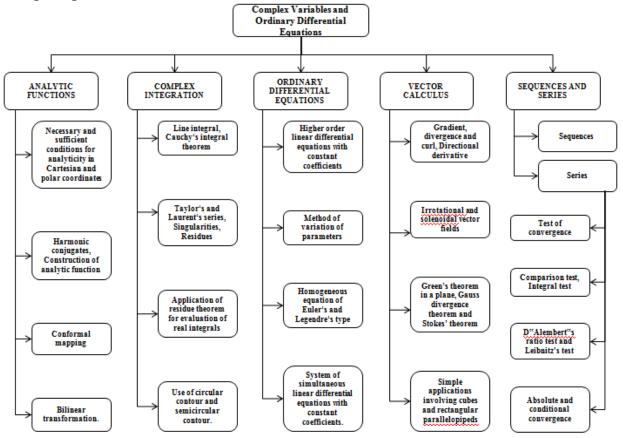
19MA202 - Calculus and Laplace Transforms

CO1	Identify and construct analytic functions and conformal mapping.	Apply
CO2	Understand the fundamental concepts of complex analysis and apply them to evaluate contour integrals.	Apply
CO3	Analyze various techniques in solving ordinary differential equations.	Analyze
CO4	Determine the vector differentiation and vector integration.	Evaluate
CO5	Test the convergene of infinite series and evaluate the limits.	Evaluate

	ECE														
Course Outcomes		Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	1	2	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	1	2
CO4	3	3	1	1	-	-	-	-	-	-	-	-	2	-	1
CO5	3	2	1	1	-	-	-	-	-	-	-	1	2	1	1

3 - Strong; 2 - Medium; 1-Low

Concept Map:



		BILLIDE B			
UNIT I	ANALYTIC FUNCTIONS	5	12		
Properties –		nt conditions for analyticity in Cartesian action of analytic function – Conformal r			
UNIT II	COMPLEX INTEGRATI	ON	12		
Singularities		Cauchy's integral formula – Taylor's and – Application of residue theorem for eva circular contour.			
UNIT III	JNIT III ORDINARY DIFFERENTIAL EQUATIONS				
Homogenous		ith constant coefficients - Method of vari ndre's type – System of simultaneous line			
UNIT IV	VECTOR CALCULUS	12			
integration -	Green's theorem in a plane, G	derivative – Irrotational and solenoidal v auss divergence theorem and Stokes' the bes and rectangular parallelopipeds.			
UNIT V	SEQUENCES AND SERI	ES	12		
convergence test – Series	: Comparison test, Integral test of positive and negative terms	es: Types and Convergence – Series of po and D"Alembert"s ratio test – Alternatin – Absolute and conditional convergence			
TOTAL: 60					
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2)] 3) [Dass, H.K., and Er. Rajnish Ver 2011 Peter V. O''Neil," Advanced En Sivarama Krishna Das P. and C Pearson Publishing 2017	rma," Higher Engineering Mathematics", gineering Mathematics", 7th Edition, Ce .Vijayakumari, "Engineering Mathematic	ngage learning, 2012.		
	Designers:				
1. Dr.	Kalyanasundaram. M	kalyanasundaram@saveetha.ac.in			
2 Me	M Gavathri Lakshmi	gavathrilakshmi@saveetha.ac.in			

2. Ms. M. Gayathri Lakshmi gayathrilakshmi@saveetha.ac.in

(COMMON to ECE & MED ELEC)

Preamble:

This course is designed to introduce the basic notions of groups, rings, fields which will then be used to solve related problems. The syllabus provides the basic concepts of vector spaces, linear transformations and inner product spaces. The course includes the concepts of numerical techniques to solve system of linear equations and to interpolate the missing data in a given range.

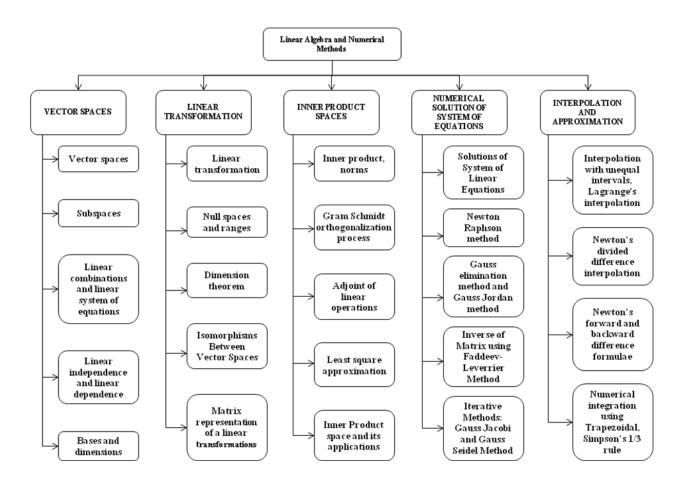
Prerequisite:

19MA202 - Calculus and Laplace Transforms

CO1	Understand the concepts of vector spaces.	Understand
CO2	Understand the concepts of vector space, linear transformations and diagonalization	Understand
CO3	Apply the concept of inner product spaces in orthogonalization.	Apply
CO4	Analyze suitable numerical techniques for solving system of linear equations.	Analyze
CO5	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values	Apply

	ECE														
Course Outcomes		Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	-	-	-	-	-	-	-	1	3	-	1
CO2	3	1	2	-	-	-	-	-	-	-	-	1	3	-	1
CO3	2	1	2	-	-	-	-	-	-	-	-	1	3	-	2
CO4	3	2	2	2	-	-	-	-	-	-	-	1	3	1	2
CO5	3	2	3	2	-	-	-	-	-	-	-	1	3	1	2

3-Strong; 2-Medium; 1-Low



3 1 0 4

SYLLABUS

UNIT I	VECTOR SPACES	12
	es – Subspaces – Linear combinations and linear system of equations and linear dependence – Bases and dimensions.	tions – Linear
UNIT II	LINEAR TRANSFORMATION	12
	rmation - Null spaces and ranges - Dimension theorem - Isomorphism's x representation of a linear transformations.	Between Vector
UNIT III	INNER PRODUCT SPACES	12
	norms - Gram Schmidt orthogonalization process - Bessel's Inequality, Par ear operations - Least square approximation- Inner Product space and its app	
UNIT IV	NUMERICAL SOLUTION OF SYSTEM OF EQUATIONS	12
method-Gauss	System of Linear Equations- Newton Raphson method, Solutions to linear elimination method- Pivoting - Gauss Jordan method - Inverse of Matrix hod - Iterative Method - Gauss Jacobi and Gauss Seidel Method.	
UNIT V	INTERPOLATION AND APPROXIMATION	12
interpolation -	with unequal intervals - Lagrange's interpolation – Newton's div Interpolation with equal intervals - Newton's forward and backward diffe egration using Trapezoidal, Simpson's 1/3 rule.	
 Sanka Privat Saumy 	XS: D.C., —Linear Algebra and its Applications ^{II} , 5th Edition, Pearson Education raRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall e, 4 th Revised Edition, New Delhi, 2017. yen Guha and Rajesh Srivastava, "Numerical methods for Engineering and S d Higher Education, New Delhi, 2010.	of India
	g, G., —Linear Algebra and its applications, Thomson (Brooks/Cole), New	Delhi, 2005.
REFERENCE	S: n, Algebra, Prentice-Hall of India,2 nd Edition, 2011.	

Course Designers:

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- 2. Mr L.Vigneswaran vigneswaranl@saveetha.ac.in

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3	1	0	4	

(COMMON TO ECE, BIO-MED & MED-ELEC)

Preamble :

This course is designed to cover the concepts of probability distributions, random processes and spectral densities for applications such as random signals, digital signal processing etc in communication engineering. The syllabus also covers the techniques of hypothesis testing for small and large samples which plays an important role in real life problems.

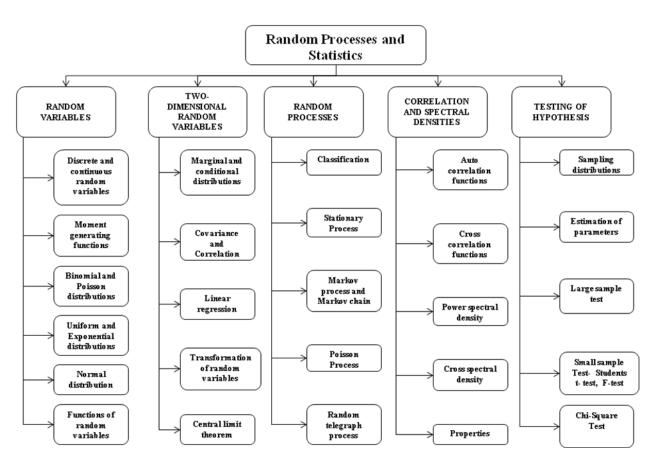
Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO2	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	Apply
CO3	Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	Analyze
CO4	Evaluate functional relationship between random inputs and outputs with the use of Random Process Techniques.	Evaluate
CO5	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply

	ECE														
Course Outcomes		Program Outcomes											Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	1	2
CO2	3	2	-	-	-	-	-	-	-	-	-	1	3	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	1	3	-	2
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	-	2
CO5	3	2	1	1	2	1	-	-	-	-	-	2	3	1	2

3-Strong; 2-Medium; 1-Low



L T PC 3 1 0 4

SYLLABUS

Dondom vori	RANDOM VARIABLES	12
Kanuoni vana	ables - Discrete and continuous random variables – Moments – Moment ge	enerating functions
– Binomial,	Poisson, Geometric, Uniform, Exponential and Normal distributions- Fu	nctions of random
variables.		
UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12
Joint distribut	tions - Marginal and conditional distributions - Covariance - Correlation a	nd linear
v	Fransformation of random variables – Central limit theorem (for independent	nt and identically
	ndom variables).	ſ
UNIT III	RANDOM PROCESSES	12
Classification	n – Stationary process – Markov process - Markov chain - Poisson p	process - Random
telegraph pro	cess.	
UNIT IV	CORRELATION AND SPECTRAL DENSITIES	12
Auto correlat	ion functions - Cross correlation functions - Properties - Power spectral de	ensity –Cross
spectral densi	ty – Properties.	
UNIT V	TESTING OF HYPOTHESIS	12
0	, variances and proportion – Chi-square test- Contingency table (Test for In TOT	AL: 60 PERIODS
		AL: 00 FERIODS
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Course Designers:

no		
1.	Ms. K. Ruth Isabels	ruthisabels@saveetha.ac.in

2. Ms. V. Kavitha <u>kavithav@saveetha.ac.in</u>



Department of Electrical and Electronics Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA202	Calculus and Laplace Transforms*	BS	3	1	0	4	2-2	-
2	19MA207	Numerical Methods and Partial Differential Equations*	BS	3	1	0	4	2-2	19MA202
3	19MA214	Series and Transforms	BS	3	1	0	4	2-2	19MA202

Note:

*Exempted for Lateral Entry Students

(COMMON TO BIO MED, ECE, EEE, EIE & MED ELEC)

Preamble:

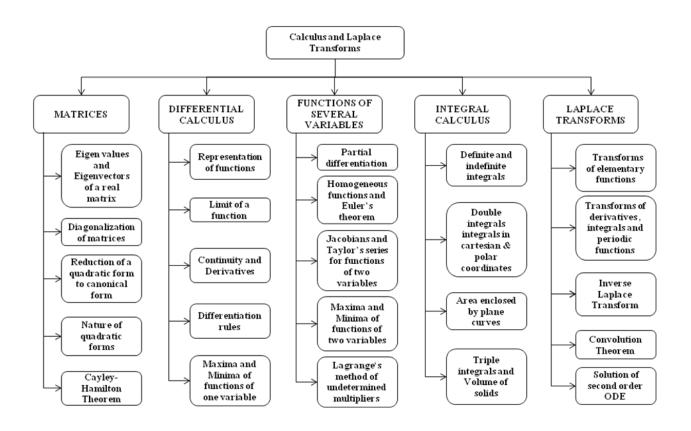
The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines. The syllabus also includes Laplace transforms in which various methods can be used to transform the time domain circuits to frequency domain to simplify the solution of differential equations.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

	EEE													
Course Outcomes		Program Outcomes Program Spec Outcomes									n Specific comes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	1	1	2
CO2	3	3	2	-	-	-	-	-	-	-	-	1	2	3
CO3	3	2	2	-	-	-	-	-	-	-	-	1	1	1
CO4	3	3	2	1	-	-	-	-	-	-	-	1	-	2
CO5	2	3	2	1	-	-	-	-	-	-	-	1	1	2

3 - Strong; 2 - Medium; 1-Low



UNIT I	MATRICES		12
– Cayley-Hamil		atrix – Characteristic equation – Properties of action of matrices – Reduction of a quadra dratic forms.	
UNIT II	DIFFERENTIAL C	CALCULUS	12
Representation of functions of o		unction - Continuity - Derivatives - Differen	tiation rules -Maxima and Minim
UNIT III	FUNCTIONS OF S	EVERAL VARIABLES	12
	s for functions of two varia	ctions and Euler's theorem – Total derivative bles – Maxima and minima of functions of t	
UNIT IV	INTEGRAL CALC	CULUS	12
	lefinite integrals - Double	e integrals – Double integrals in polar coor	dinates – Area enclosed by plan
	ntegrals – Volume of solid		
curves – Triple i			12
curves – Triple i UNIT V Existence condit Basic properties transforms – Co	ntegrals – Volume of solid LAPLACE TRANS tions – Transforms of elem – Shifting theorems -Tran	SFORMS mentary functions – Transform of unit step functions of derivatives and integrals – Initial asform of periodic functions – Application	12 Inction and unit impulse function and final value theorems – Invers
curves – Triple i UNIT V Existence condit Basic properties transforms – Co	ntegrals – Volume of solid LAPLACE TRANS tions – Transforms of elem – Shifting theorems -Tran onvolution theorem – Tran	SFORMS mentary functions – Transform of unit step functions of derivatives and integrals – Initial asform of periodic functions – Application	12 Inction and unit impulse function and final value theorems – Invers
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(COMMON to EEE & EIE)

Preamble :

The course is designed to provide necessary concepts of standard probability distributions and suitable numerical techniques for curve fitting, interpolation and solving system of equations which are applied in random signals and power systems. The syllabus provides a sound knowledge of Vector calculus which plays an important role in differential geometry and in the study of partial differential equations. Vector calculus is used extensively in electromagnetic fields, gravitational fields and fluid flow.

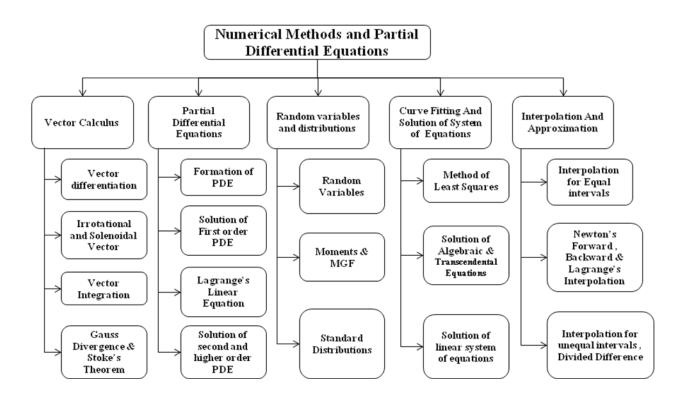
Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Evaluate line and surface integrals in vector fields.	Evaluate
CO2	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO3	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO4	Acquire knowledge in curve fitting techniques and solving linear equations.	Analyze
CO5	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply

	EEE													
Course Outcomes					I	Program	n Outco	omes					Prog Spe Outc	gram cific omes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2
CO2	3	2	1	2	-	-	-	-	-	-	-	1	2	2
CO3	3	1	2	1	-	-	-	-	-	-	-	1	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	1	2	-
CO5	3	2	1	1	-	-	-	-	-	-	-	1	2	3

3 – Strong; 2 – Medium; 1-Low



		VECTOR CALCULUS	12
integrati	ion –Ga	gence and curl – Directional derivative – Irrotational and solenoid vector uss divergence theorem and Stoke's theorem (excluding proofs) – Simple applingular parallelopipeds.	
UNIT I	Ι	PARTIAL DIFFERENTIAL EQUATIONS	12
different	tial equa	rtial differential equations – Singular integrals - Solutions of standard types of fa ations - Lagrange's linear equation - Linear partial differential equations of secon tant coefficients of both homogeneous and non-homogeneous types.	
UNIT I	II	RANDOM VARIABLES AND DISTRIBUTIONS	12
		ntinuous random variables – Moments – Moment generating functions – Binomi onential, Weibull Distributions.	al, Poisson,
UNIT I	V	CURVE FITTING AND SOLUTION OF SYSTEM OF EQUATIONS	12
of algeb	oraic and	Method of least squares - Straight Lines - Quadratic and Parabola– Exponential d transcendental equations – Newton Raphson method- Solution of linear syste as elimination method – Gauss Jordan method – Iterative methods of Gauss J	m of equations –
UNIT V	7	INTERPOLATION AND APPROXIMATION	12
		vith equal intervals – Newton's forward and backward difference formul nterpolation with unequal intervals - Newton's divided difference interpolation.	ae - Lagrange's
		ТОТА	L: 60 PERIODS
TEXT I	BOOKS	:	
1)		ajan. T., "Transforms and Partial Differential Equations", Second reprint, Tata M ion Pvt. Ltd., New Delhi, 2012.	AcGraw Hill
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- 2. Ms. V N Jayamani jayamani@saveetha.ac.in
 - 79

19MA214	Series and Transforms	L T P C 3 1 0 4
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Preamble :

The aim of this course is to develop an understanding of convergence of sequences and series. The syllabus includes Fourier series analysis which is central to many applications in engineering. The course is designed to study and understand the behavior of transforms such as Fourier Transform, Discrete Fourier Transform, Z Transform and Wavelet Transform which are widely used in Signal Processing.

Prerequisite :

19MA202 - Calculus and Laplace Transforms

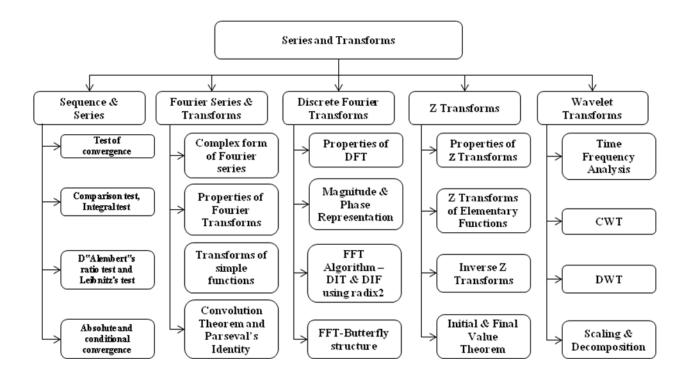
Course Outcomes: At the end of the course learners will be able to:

CO1	Study the convergence of real sequences and apply them to study the convergence behavior of various infinite series.	Apply
CO2	Calculate the complex form of the Fourier series for standard periodic waveforms and evaluate the Fourier transforms which represents frequency domain of signals.	Evaluate
CO3	Study the frequency domain representation of discrete time signal using Discrete time Fourier Transform.	Analyze
CO4	To Analyze the properties and techniques of Z transform.	Analyze
CO5	Understand the wavelet transform concepts which are necessary for data compression and noise suppression.	Understand

Mapping with PO and PSOs

	EEE													
Course Outcomes						Program	n Outco	mes					Progran Outo	n Specific comes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	1	2
CO3	3	2	2	1	-	-	-	-	-	-	-	-	2	3
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	3
CO5	3	2	1	1	-	-	-	-	-	-	-	-	1	3

3-Strong; 2-Medium; 1-Low



19MA214	Series and Transforms	L T P C 3 1 0 4
	CVI I A DUC	

UNIT I	SEQUENCE AND SERIES	12
	Definition and examples – Series: Types and Convergence – Series of post	
	ence: Comparison test, Integral test and D'Alembert's ratio test - A	
Leibnitz's tes	t - Series of positive and negative terms - Absolute and conditional conve	ergence.
UNIT II	FOURIER SERIES AND TRANSFORMS	12
	n of Fourier series – Statement of Fourier integral theorem – Fourier trans	
Properties – 7	Fransforms of simple functions - Convolution theorem - Parseval's identi-	ty.
UNIT III	DISCRETE FOURIER TRANSFORMS	12
Discrete Four	ier Transform - properties, magnitude and phase representation – computation	ation of DFT using
FFT algorithm	n –DIT & DIF using radix2 - FFT-Butterfly structure.	
UNIT IV	Z TRANSFORMS	12
Z-transforms	- Elementary properties - Inverse Z-transform using partial fractions and	residues –Initial
and final valu	e theorems - Convolution theorem.	
UNIT V	WAVELET TRANSFORMS	12
	of time frequency analysis-Continuous wavelet Transform-CWT as	operator-Discrete
Introduction	of the frequency analysis-continuous wavelet fransform-CWF as	operator Discret
	form introduction-scaling function-Decomposition-Interpolation.	operator Discret
	form introduction-scaling function-Decomposition-Interpolation.	AL: 60 PERIODS
	form introduction-scaling function-Decomposition-Interpolation.	-
wavelet trans	form introduction-scaling function-Decomposition-Interpolation. TOT KS:	AL: 60 PERIODS
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2. Ms. V .N. Jayamani jayamani@saveetha.ac.in



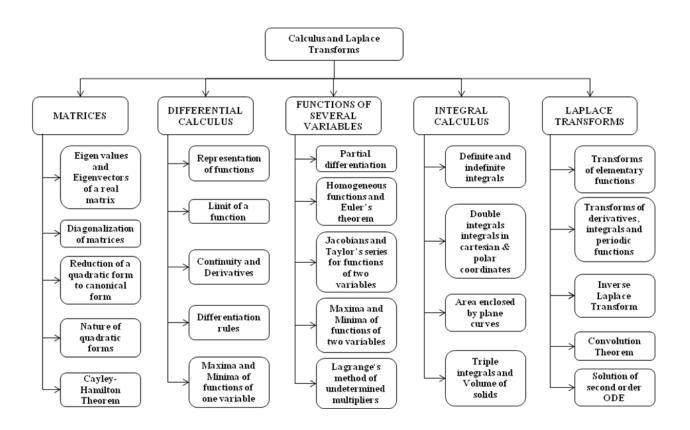
Department of Electrical and Instrumentation Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA202	Calculus and Laplace Transforms*	BS	3	1	0	4	2-2	-
2	19MA207	Numerical Methods and Partial Differential Equations*	BS	3	1	0	4	2-2	19MA202
3	19MA214	Series and Transforms	BS	3	1	0	4	2-2	19MA202

Note:

*Exempted for Lateral Entry Students

							E	IE						
Course Outcomes		Program Outcomes											Progran Outo	n Specific comes
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	1	2	1
CO2	3	3	2	-	-	-	-	-	-	-	-	1	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	1	1	-
CO4	3	3	2	1	-	-	-	-	-	-	-	1	2	2
CO5	2	3	2	1	-	-	-	-	-	-	-	-	3	3



L T P C 3 1 0 4

SYLLABUS

MATRICES genvectors of a real matrix – Characteristic equation – Properties of Eigen values a theorem – Diagonalization of matrices – Reduction of a quadratic form to can nation – Nature of quadratic forms. DIFFERENTIAL CALCULUS unctions - Limit of a function - Continuity - Derivatives - Differentiation rules -M variable. FUNCTIONS OF SEVERAL VARIABLES on – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Maxima and minima of functions of two variables – Itipliers.	nonical form by 12 Iaxima and Minim 12 ariables – Jacobian
theorem – Diagonalization of matrices – Reduction of a quadratic form to can nation – Nature of quadratic forms. DIFFERENTIAL CALCULUS unctions - Limit of a function - Continuity - Derivatives - Differentiation rules -M variable. FUNCTIONS OF SEVERAL VARIABLES on – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Maxima and minima of functions of two variables –	nonical form by 12 Iaxima and Minim 12 ariables – Jacobian
Inctions - Limit of a function - Continuity - Derivatives - Differentiation rules -M variable. FUNCTIONS OF SEVERAL VARIABLES on – Homogeneous functions and Euler's theorem – Total derivative – Change of va r functions of two variables – Maxima and minima of functions of two variables –	axima and Minim 12 ariables – Jacobian
variable. FUNCTIONS OF SEVERAL VARIABLES on – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Maxima and minima of functions of two variables –	12 ariables – Jacobian
n – Homogeneous functions and Euler's theorem – Total derivative – Change of va f functions of two variables – Maxima and minima of functions of two variables –	ariables – Jacobian
functions of two variables - Maxima and minima of functions of two variables -	
INTEGRAL CALCULUS	12
nite integrals - Double integrals – Double integrals in polar coordinates – Area grals – Volume of solid	enclosed by plan
LAPLACE TRANSFORMS	12
s – Transforms of elementary functions – Transform of unit step function and unit Shifting theorems -Transforms of derivatives and integrals – Initial and final value plution theorem – Transform of periodic functions – Application to solution of I equations with constant coefficients.	theorems - Invers
ТОТ	AL: 60 PERIOD
—Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Edition, dvanced Engineering Mathematics, John Wiley & Sons. Singapore, 10th edition, 2 ra, Fundamentals of Mathematics Differential Calculus, Pearson Education India, Ju	2015.
vens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. I Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New D a. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Viswanathan Pul 9. I and Bhunia, S.C, Engineering Mathematics, Oxford University Press, 2015. , Engineering Mathematics I, Tata McGraw Hill Publishing Co, 5th edition, 2013	blishers Pvt. Ltd.,
	grals – Volume of solid LAPLACE TRANSFORMS s – Transforms of elementary functions – Transform of unit step function and unit Shifting theorems -Transforms of derivatives and integrals – Initial and final value Solution theorem – Transform of periodic functions – Application to solution of lequations with constant coefficients. TOT —Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Edition, dvanced Engineering Mathematics, John Wiley & Sons. Singapore, 10th edition, 2 ra, Fundamentals of Mathematics Differential Calculus, Pearson Education India, June vens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. I yengar S.R.K., Advanced Engineering Mathematics, Narosa Publications, New E . and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Viswanathan Pul 9. 1 and Bhunia, S.C, Engineering Mathematics, Oxford University Press, 2015.

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- 2. Mr.L.Vigneswaran vigneswaranl@saveetha.ac.in

(COMMON to EEE & EIE)

Preamble :

The course is designed to provide necessary concepts of standard probability distributions and suitable numerical techniques for curve fitting, interpolation and solving system of equations which are applied in random signals and power systems. The syllabus provides a sound knowledge of Vector calculus which plays an important role in differential geometry and in the study of partial differential equations. Vector calculus is used extensively in electromagnetic fields, gravitational fields and fluid flow.

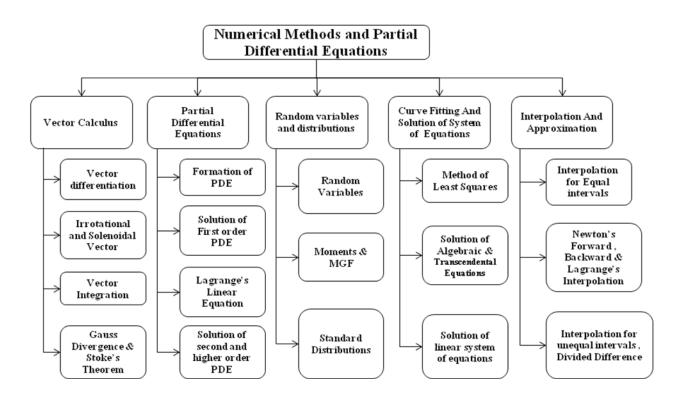
Prerequisite :

19MA202 - Calculus and Laplace Transforms

C01	Evaluate line and surface integrals in vector fields.	Evaluate
CO2	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO3	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO4	Acquire knowledge in curve fitting techniques and solving linear equations.	Analyze
CO5	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply

							EIF	2						
Course Outcomes		Program Outcomes											Program Specific Outcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	2
CO2	3	2	1	2	-	-	-	-	-	-	-	1	2	2
CO3	3	1	2	1	-	-	-	-	-	-	-	1	2	-
CO4	3	2	2	-	-	-	-	-	-	-	-	1	2	-
CO5	3	2	1	1	-	-	-	-	-	-	-	1	2	3

3 – Strong; 2 – Medium; 1-Low



integratio involving UNIT II Formatio partial di and high UNIT II	 divergence and curl – Directional derivative – Irrotational and solenoid vector on –Gauss divergence theorem and Stoke's theorem (excluding proofs) – Sim g cubes and rectangular parallelopipeds. PARTIAL DIFFERENTIAL EQUATIONS n of partial differential equations – Singular integrals - Solutions of standard types fferential equations - Lagrange's linear equation - Linear partial differential equation 	nple applications
involving UNIT II Formatio partial di and highe UNIT II	cubes and rectangular parallelopipeds. PARTIAL DIFFERENTIAL EQUATIONS n of partial differential equations – Singular integrals - Solutions of standard types fferential equations - Lagrange's linear equation - Linear partial differential equati	12
UNIT II Formatio partial di and highe UNIT II	PARTIAL DIFFERENTIAL EQUATIONS n of partial differential equations – Singular integrals - Solutions of standard types fferential equations - Lagrange's linear equation - Linear partial differential equati	
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partial di and high UNIT II	fferential equations - Lagrange's linear equation - Linear partial differential equati	- ffinet 1
	er order with constant coefficients of both homogeneous and non-homogeneous ty	ions of second
Discrete	I RANDOM VARIABLES AND DISTRIBUTIONS	12
	and continuous random variables – Moments – Moment generating functions – Bi c, Exponential, Weibull Distributions.	nomial, Poisson,
UNIT IV	CURVE FITTING AND SOLUTION OF SYSTEM OF EQUATIONS	12
Solution equations	ting – Method of least squares - Straight Lines - Quadratic and Parabola– Exp of algebraic and transcendental equations – Newton Raphson method- Solution of s – Pivoting - Gauss elimination method – Gauss Jordan method – Iterative m d Gauss Seidel.	linear system of
UNIT V	INTERPOLATION AND APPROXIMATION	12
	tion with equal intervals – Newton's forward and backward difference formul tion - Interpolation with unequal intervals - Newton's divided difference interpolation	
	ΤΟΤΑΙ	L: 60 PERIODS
TEXT B	OOKS:	
	Veerarajan. T., "Transforms and Partial Differential Equations", Second reprint, Ta Education Pvt. Ltd., New Delhi, 2012.	ata McGraw Hill
,	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10 Delhi, 2016.	th Edition, New
,	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Publishers, 10th Edition, New Delhi, 2015.	Khanna
REFER	ENCES :	
,	be.O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, Reprint, 2007.	, 1st Indian
	Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathem Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai,	
	Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Rew Delhi, 2007S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.	Hill,5th Edition,
4) 3	Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Pre	ess, 2015.
5)	Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016	

Course Designers:

- 1. Dr. J. Joy Priscilla joypriscilla@saveetha.ac.in
- 2. Ms. V .N. Jayamani jayamani@saveetha.ac.in

(FOR EEE & EIE)

Preamble :

The aim of this course is to develop an understanding of convergence of sequences and series. The syllabus includes Fourier series analysis which is central to many applications in engineering. The course is designed to study and understand the behavior of transforms such as Fourier Transform, Discrete Fourier Transform, Z Transform and Wavelet Transform which are widely used in Signal Processing.

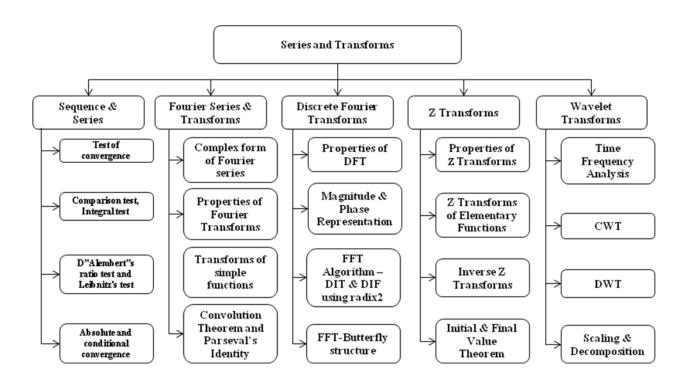
Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Study the convergence of real <i>sequences</i> and apply them to study	Apply
	the convergence behavior of various infinite series.	
CO2	Calculate the complex form of the Fourier series for standard periodic waveforms and evaluate the Fourier transforms which represents frequency domain of signals.	Evaluate
CO3	Study the frequency domain representation of discrete time signal using Discrete time Fourier Transform.	Analyze
CO4	To Analyze the properties and techniques of Z transform.	Analyze
CO5	Understand the wavelet transform concepts which are necessary for data compression and noise suppression.	Understand

							E	IE						
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	-	2	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	1	2
CO3	3	2	2	1	-	-	-	-	-	-	-	-	2	3
CO4	3	2	1	1	-	-	-	-	-	-	-	-	-	3
CO5	3	2	1	1	-	-	-	-	-	-	-	-	1	3

3-Strong; 2-Medium; 1-Low



19MA214	Series and Transforms	L T P C 3 1 0 4
	CVI I A DUC	

UNIT I	SEQUENCE AND SERIES	12
Sequences: D	efinition and examples - Series: Types and Convergence - Series of positi	ve terms -Tests
U	nce: Comparison test, Integral test and D'Alembert's ratio test - Alt	U
Leibnitz's tes	t – Series of positive and negative terms – Absolute and conditional conver	gence.
UNIT II	FOURIER SERIES AND TRANSFORMS	12
Complex for	n of Fourier series – Statement of Fourier integral theorem – Fourier transfo	orm pair–
Properties - 7	Transforms of simple functions - Convolution theorem - Parseval's identity	•
UNIT III	DISCRETE FOURIER TRANSFORMS	12
Discrete Four	ier Transform - properties, magnitude and phase representation – computation	ion of DFT using
FFT algorithm	n –DIT & DIF using radix2 - FFT-Butterfly structure.	C
UNIT IV	Z TRANSFORMS	12
Z-transforms	- Elementary properties – Inverse Z-transform using partial fractions and re	sidues –Initial
	e theorems - Convolution theorem.	
UNIT V	WAVELET TRANSFORMS	12
Introduction	of time frequency analysis-Continuous wavelet Transform-CWT as	operator-Discrete
	form introduction-scaling function-Decomposition-Interpolation.	- F
		L: 60 PERIODS
TEXT BOO	 XS:	
	N., Goyal M. and Watkins C., —Advanced Engineering Mathematics, Fire	wall Media (An
	nt of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.	wan wooda (7 m
-	llustrated Wavelet Transform Handbook: Introductory Theory and Applicat	tions in Science.
	eering, Medicine and Finance, Second EditionHardcover – Import, 26 Jan	
	son, CNC Press.	·
3) Algo	ithms for Discrete Fourier Transform and Convolution - Tolimieri R, Sprin	ger publications.
REFERENC	ES:	
1) G. Ja	mes, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson H	Education.2007.
	• •	
2) L.C /	andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPI	E Press, 1999.
 2) L.C A 3) N.P. 	• •	E Press, 1999.
 L.C.A N.P. Public 	Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIF Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Ec cations Pvt. Ltd, 2014.	E Press, 1999. lition, Laxmi
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 L.C.A N.P. Publi Intro (Author) 	Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIF Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Ec cations Pvt. Ltd, 2014. Iuction to Wavelets and Wavelet Transforms: A Primer 1st Edition - C. Sid	E Press, 1999. lition, Laxmi ney Burrus 98

Igi

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Department of Information Technology

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra*	BS	3	1	0	4	2-2	-
2	19MA206	Logic and Combinatorics*	BS	3	1	0	4	2-2	19MA201
3	19MA212	Algebra and Number Theory	BS	3	1	0	4	2-2	19MA201
4	19MA218	Probability and Queueing Theory	BS	3	1	0	4	2-2	19MA201

Note:

*Exempted for Lateral Entry Students

(COMMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

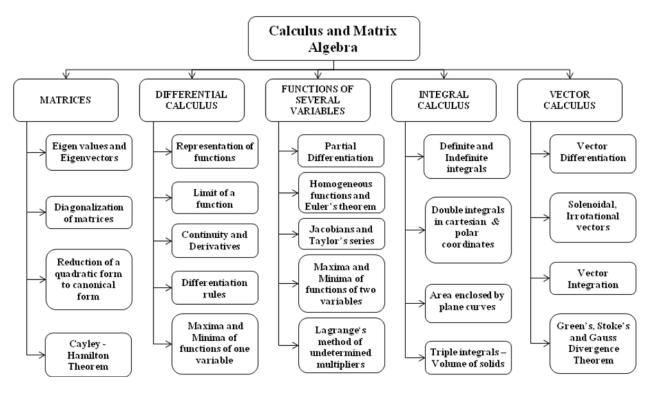
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

	IT													
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	2	1
CO2	3	2	2	1	-	-	-	-	-	-	-	1	2	1
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1
CO4	3	3	1	-	-	-	-	-	-	-	-	-	2	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-	1	1



UNIT I	MATRICES	12						
and Eigenvec	and Eigenvectors of a real matrix – Characteristic equation – Properties of tors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	•						
UNIT II	DIFFERENTIAL CALCULUS	12						
.	n of functions - Limit of a function - Continuity - Derivatives - Differ Minima of functions of one variable.	entiation rules -						
UNIT III	UNIT III FUNCTIONS OF SEVERAL VARIABLES							
variables – Ja	entiation – Homogeneous functions and Euler's theorem – Total derivati cobians – Taylor's series for functions of two variables – Maxima and min es – Lagrange's method of undetermined multipliers.	U						
UNIT IV	INTEGRAL CALCULUS	12						
	Indefinite integrals - Double integrals – Double integrals in polar coo lane curves – Triple integrals – Volume of solids.	rdinates – Area						
UNIT V	VECTOR CALCULUS	12						
integration -	ergence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem ple applications involving cubes and rectangular parallelepipeds.	orem (excluding						
		L: 60 PERIODS						
TEXT BOOI 1) Grewal H 2015.	AS: B.S., —Higher Engineering Mathematics∥, Khanna Publishers, New Delhi, 4.	3rd Edition,						
,	ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N .E Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10t							
REFERENC	ES :							
1) Anton, H	I, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016.							
,	. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publicati h Edition, 2016.	ons, New						
	an, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Visw rs Pvt. Ltd., Chennai, 2009.	vanathan						
4) Srimantl	na Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Press,	2015.						
5) Veeraraj 2013.	an.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, NewDe	elhi, 5th edition,						

Course Designers:

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 Ms. P. S. Narmathadevi

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(COMMON to CSE & IT)

Preamble :

This course covers the mathematical topics most directly related to computer science. Topics includes: logic, count ability and counting arguments, proof techniques. Software engineering uses graphs, trees and other data structures. Logic is used in AI research in theorem proving and in database query systems.

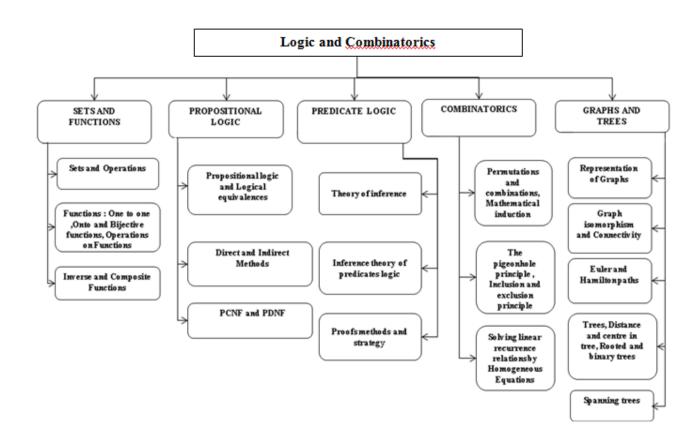
Prerequisite:

19MA201- Calculus and Matrix Algebra

CO1	Construct the class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	Understand
CO2	To extend student's logical and mathematical maturity and ability to deal with abstraction.	Analyze
CO3	Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.	Evaluate
CO4	Construct the recurrence relation for a given engineering problems and solve the recurrence equation.	Apply
CO5	Demonstrate different traversal methods for trees and graphs.	Understand

	IT													
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	-	2	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-	-	1

3 – Strong; 2 – Medium; 1-Low



UNIT I	SETS AND FUNCTIONS	12						
	ations — Proofs of set identities — Relations — Equivalence relations –Fur							
one, onto and	bijective functions, operations on functions : Inverse and composite Function	ons.						
UNIT II	PROPOSITIONAL LOGIC	12						
	logic – Arguments – Logical laws – Logical equivalences – Direct and India NF (Using Truth tables and Laws).	rect Methods-						
UNIT IIIPREDICATE LOGIC12								
•	erence – Quantifiers— Predicate formulas—Inference theory of predicates learning trategy—Direct method of proofs and Indirect method of proofs.	ogic. Proofs						
UNIT IV	COMBINATORICS	12						
principle — In relations – Ge	ciples — Permutations and combinations — Mathematical induction – The aclusion and exclusion principle — Recurrence relations – Solving linear re nerating functions (Homogeneous Equations).	currence						
UNIT V	GRAPHS AND TREES	12						
and Hamilton	n of graphs – Directed and indirected graphs – Graph isomorphism – Conne graphs. ties of trees– Distance and centre in tree– Rooted and binary trees–Spanning							
	TOTA	L: 60 PERIODS						
 Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011. Tremblay, J.P. and Manohar.R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011. J.L., Mott, A. Kandel, T.P. Baker, "Discrete Maths for Computer Scientists & Mathematics". Second 								
REFERENC	rentice Hall of India Pvt Limited, New Delhi,2009.							
 Lipschutz Pub. Co. Ralph. P. 	z, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata M Ltd., New Delhi, 3rd Edition, 2010. Grimaldi, Discrete and Combinatorial Mathematics: An Applied Introduction							
 Fourth Edition, Pearson Education Asia, Delhi, 2006. Thomas Koshy, Discrete Mathematics with Applications, Elsevier Publications, 2006. Seymour Lipschutz and Mark Lipson, Discrete Mathematics, Schaum's Outlines, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, Second edition, 2011. 								
5. Dr. A.Sir	ngaravelu and Dr. M. P. Jeyaramam.,"Graph Theory and Applications" First Mohapatra Elements of Discrete Mathematics: A Computer Oriented Appr							
Course Desi 1.								
2.	Dr. M. Ramesh Kumar <u>rameshkumar@saveetha.ac.in</u>							

19MA212	Algebra and Number Theory	LTPC
		3 1 0 4

(COMMON to CSE and IT)

Preamble:

This course gives an integrated approach to number theory and abstract algebra, and provide a firm basis for arithmetic's in computer science field. The concepts of divisibility, prime number, GCD, LCM and modular arithmetic in number theory are used in computer programming. The concept of congruence is used in coding theory and cryptography.

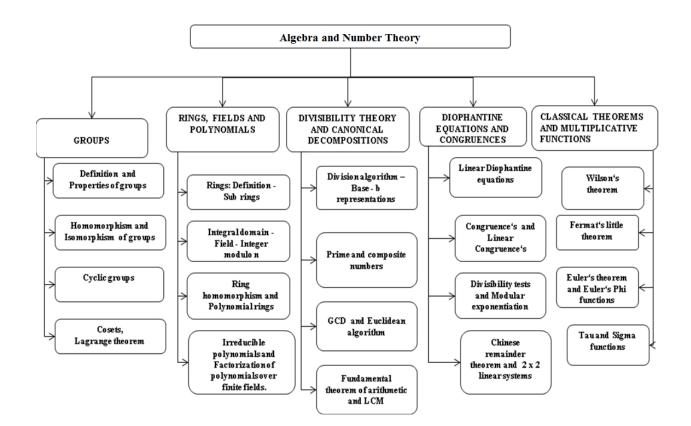
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Apply the basic notions of groups which will then be used to solve related problems	Apply
CO2	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.	Understand
CO3	Demonstrate accurate and efficient use of advanced algebraic techniques.	Evaluate
CO4	Demonstrate their mastery by solving non - trivial problems related to the concepts.	Evaluate
CO5	Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.	Apply

								IT						
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	1
CO2	3	3	2	1	-	-	-	-	-	-	-	-	-	1
CO3	3	3	2	1	-	-	-	-	-	-	-	-	2	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	1	-	-	-	-	-	-	-	-	1	-

3 – Strong; 2 – Medium; 1-Low



LTPC

3 1 0 4

SYLLABUS

UNIT I	GROUPS	12
Groups : Det theorem.	inition - Properties - Homomorphism - Isomorphism - Cyclic groups -	Cosets - Lagrange's
UNIT II	RINGS, FIELDS AND POLYNOMIALS	12
Ų	tion - Sub rings - Integral domain - Field - Integer modulo n - Ring ngs - Irreducible polynomials over finite fields - Factorization of poly	
UNIT III	12	
	orithm – Base - b representations –Prime and composite numbers lidean algorithm – Fundamental theorem of arithmetic – LCM.	
UNIT IV	DIOPHANTINE EQUATIONS AND CONGRUENCES	12
	antine equations – Congruence's – Linear Congruence's - Applications: ponentiation-Chinese remainder theorem – 2×2 linear systems.	Divisibility tests
UNIT V	CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS	12
Wilson's theo functions.	orem – Fermat's little theorem – Euler's theorem – Euler's Phi functions	– Tau and Sigma
	TOI	TAL: 60 PERIODS
Educa	aldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", ation, 5th Edition, New Delhi, 2007. y, T., —Elementary Number Theory with Applications, Elsevier Publicat	
Publica 2. Lidl, 3. Niver Numb 4. Andre	ES:. ing and Chaoping Xing, —Coding Theory – A first Course, Cambridge ations, Cambridge, 2004 R. and Pitz, G, "Applied Abstract Algebra", 2 nd Edition Springer Verlag, a, I., Zuckerman.H.S., and Montgomery, H.L., —An Introduction to Theorers, John Wiley and Sons, Singapore, 2004. wws, G. E, "Number theory", Dover publications, Newyork, 2012. ein, I. N, "Topics in Algebra", 2 nd Edition, John Wiley and Sons, India.	

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2. Mr. H.Prathab

prathab@saveetha.ac.in

19MA218	Probability and Queueing Theory	LTPC
19WIA210		3 1 0 4

(COMMON to CSE & IT)

Preamble :

This course is designed to provide necessary basic concepts in probability, standard distributions and random processes which are widely applied in random signals, linear systems in communication engineering and IT fields. The syllabus also covers the concepts of Markovian and advanced queueing models which are essential to design and analyze computer networks.

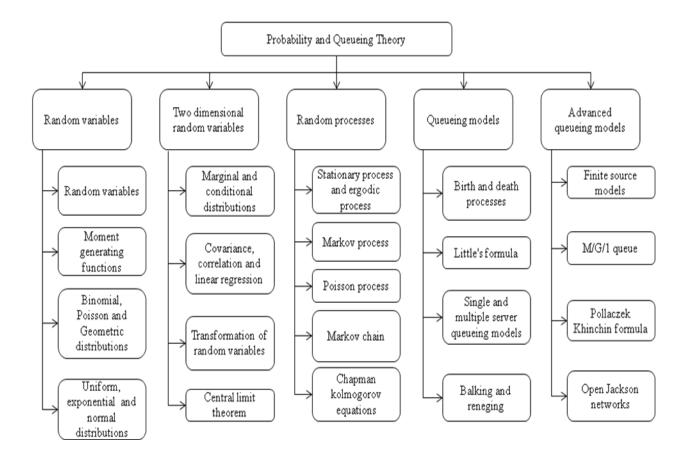
Prerequisite :

19MA201 - Calculus and Matrix Algebra

CO1	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO2	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	Apply
CO3	Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	Analyze
CO4	Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.	Analyze
CO5	Analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.	Analyze

	IT													
Course Outcome s		Program Outcomes Program Specific Outcomes												
	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	-	-	-	-	-	-	1	1	1
CO2	3	3	2	2	1	-	-	-	-	-	-	-	1	1
CO3	3	3	2	2	1	-	-	-	-	-	-	1	2	2
CO4	3	3	2	1	1	-	-	-	-	-	-	1	1	1
CO5	3	3	2	1	1	-	-	-	-	-	-	1	1	1

3 – Strong; 2 – Medium; 1-Low



19MA218	

Probability and Queueing Theory

L	Т	P	C	
3	1	0	4	

SYLLABUS

UNIT I	RANDOM VARIABLES AND DISTRIBUTIONS	12
	continuous random variables -Functions of a random variable-Moment	
<u> </u>	nctions – Binomial Poisson, Geometric, Uniform, Exponential, and Normal	distributions
UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12
	tions – Marginal and conditional distributions – Covariance – Correlation an Fransformation of random variables –Central limit theorem.	d Linear
UNIT III	RANDOM PROCESSES	12
	a – Stationary process – Ergodic process – Markov process – Poisson proce arkov chain – Classification of state of a Markov Chain – Chapman	
UNIT IV	QUEUEING MODELS	12
	ueues – Birth and Death processes – Single and multiple server queuei ula - Queues with finite waiting rooms – Queues with impatient customers	
UNIT V	ADVANCED QUEUEING MODELS	12
	models $M/C/1$ group Dollaggelt Khinghin formula $M/D/1$ and M/EV	7/1
	models - $M/G/1$ queue – Pollaczek Khinchin formula - $M/D/1$ and M/Ek s queues – Open Jackson networks.	1 as special
	s queues – Open Jackson networks.	.: 60 PERIOD
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TEXT BOO 1) Ibe. (Repr 2) Gros REFERENC 1) Trive	s queues – Open Jackson networks. TOTAI KS: D.C., "Fundamentals of Applied Probability and Random Processes", Elsevie int, 2014. s. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student of	2: 60 PERIOD or, 1st Indian edition, 2012
TEXT BOO 1) Ibe. (Repr 2) Gros REFERENC 1) Trive Appl 2) Hwe	TOTAI KS: D.C., "Fundamentals of Applied Probability and Random Processes", Elsevie int, 2014. s. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student of CES : edi.K.S., "Probability and Statistics with Reliability, Queueing and Computer	.: 60 PERIOD or, 1st Indian edition, 2012 Science
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cases – SeriesTEXT BOO1)Ibe. (Repr2)GrosREFERENC1)Trive Appl2)Hwe Rand3)Robe 3rd E 4)4)Yates	TOTAI KS: D.C., "Fundamentals of Applied Probability and Random Processes", Elsevie int, 2014. s. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student of CES : edi.K.S., "Probability and Statistics with Reliability, Queueing and Computer ications", 2nd Edition, John Wiley and Sons, 2016. Hsu, "Schaum"s Outline of Theory and Problems of Probability, Random V om Processes", Tata McGraw Hill Edition, New Delhi, 2014. rtazzi, "Computer Networks and Systems: Queueing Theory and Performance	2: 60 PERIOD er, 1st Indian edition, 2012 Science fariables and e Evaluation",

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Department of Mechanical Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA201	Calculus and Matrix Algebra*	BS	3	1	0	4	2-2	-
2	19MA205	Differential Equations and Laplace Transforms*	BS	3	1	0	4	2-2	19MA201
3	19MA211	Statistics and Numerical Methods	BS	3	0	2	4	2-1-2	19MA201 • Theory C- 2 • Practical C – 1 • No Observation • Only record

Note:

*Exempted for Lateral Entry Students

19MA201	Calculus and Matrix Algebra	LTPC
19MA201	C C	3 1 0 4

(COMMON TO AGRI, CHEMICAL, CIVIL, CSE, IT & MECH)

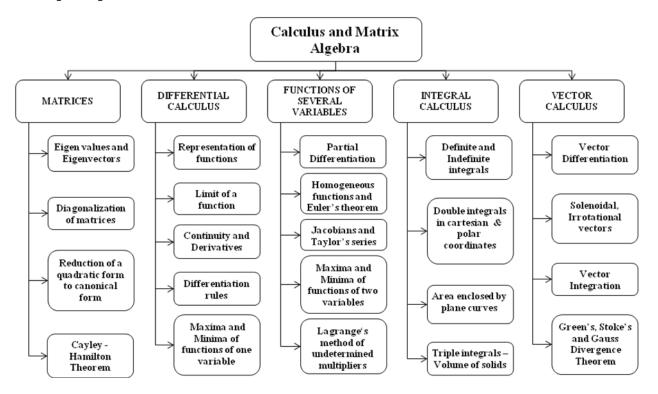
Preamble:

The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate line and surface integrals in vector fields.	Evaluate

								MEC	CH						
Course Outcomes		Program Outcomes Program Specific Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	3	2
CO2	3	2	2	1	-	-	-	-	-	-	-	1	3	3	2
CO3	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2
CO4	3	3	1	-	-	-	-	-	-	-	-	-	3	2	2
CO5	3	2	2	1	-	-	-	-	-	-	-	-	3	2	2



SYLLABUS

UNIT I	MATRICES	12
and Eigenvect	and Eigenvectors of a real matrix – Characteristic equation – Properties of ors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction ical form by orthogonal transformation – Nature of quadratic forms.	
UNIT II	DIFFERENTIAL CALCULUS	12
.	n of functions - Limit of a function - Continuity - Derivatives - Differ Ainima of functions of one variable.	entiation rules -
UNIT III	FUNCTIONS OF SEVERAL VARIABLES	12
variables – Jac	ntiation – Homogeneous functions and Euler's theorem – Total derivation cobians – Taylor's series for functions of two variables – Maxima and mines – Lagrange's method of undetermined multipliers.	0
UNIT IV	INTEGRAL CALCULUS	12
	Indefinite integrals - Double integrals – Double integrals in polar coo ane curves – Triple integrals – Volume of solids.	rdinates – Area
UNIT V	VECTOR CALCULUS	12
integration –	ergence and curl – Directional derivative – Irrotational and solenoidal vector Green's theorem in a plane, Gauss divergence theorem and Stokes' the ple applications involving cubes and rectangular parallelepipeds.	
	TOTAL	L: 60 PERIODS
2015. 2) James Ste	XS: B.S., —Higher Engineering Mathematics ^{II} , Khanna Publishers, New Delhi, 4 ewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, N B. Advanced Engineering Mathematics, John Wiley & Sons. Singapore, 10t	lew Delhi, 2015.
REFERENC	· · · · · · · · · · · · · · · · · · ·	,
 Anton, H Jain R.K Delhi, 5t 	I, Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. . and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Publicat h Edition, 2016.	
Publisher	an, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S. Visw rs Pvt. Ltd., Chennai, 2009.	
	a Pal and Bhunia, S.C, Engineering Mathematics, Oxford University Press, an.T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, NewD	

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2 Ms. P. S. Narmathadevi <u>narmathadevi@saveetha.ac.in</u>

19MA205	Differential Equations and Lonloss Transforms	LTPC
	Differential Equations and Laplace Transforms	3 1 0 4
	(COMMON TO CHEMICAL, CIVIL & MECHANICAL)	

Preamble :

This course is designed to cover topics such as Fourier series, Differential equations and Laplace Transforms. The syllabus includes various techniques to solve differential equations which are essential to handle practical problems arising in the field of engineering. Fourier series are widely used in signal analysis to find strength and vibrations of buildings. The course includes Laplace transforms in which various methods can be used to transform the time domain functions to frequency domain.

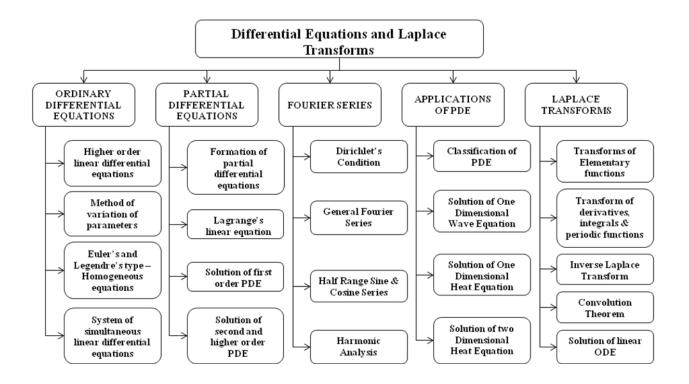
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Analyze the suitable techniques for solving second and higher order differential equations.	Analyze
CO2	Apply suitable concepts in solving first order and higher order partial differential equations with constant coefficients.	Apply
CO3	Evaluate the Fourier series for standard periodic waveforms.	Evaluate
CO4	Apply the Fourier series techniques to solve wave and heat equations.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

							MI	ECH							
Course Outcomes		Program Outcomes													ecific s
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	1	-	-	-	-	-	-	-	1	3	3	2
CO2	3	3	2	2	-	-	-	-	-	-	-	1	3	3	2
CO3	3	2	3	1	-	-	-	-	-	-	-	-	3	2	2
CO4	3	3	2	2	-	-	-	-	-	-	-	-	3	2	2
CO5	3	3	2	1	-	-	-	-	-	-	-	-	3	2	2

3 – Strong; 2 – Medium; 1-Low



19MA205

Differential Equations and Laplace Transforms

L T PC 3 1 0 4

SYLLABUS

UNIT I	ORDINARY DIFFERENTIAL EQUATIONS	12				
	r linear differential equations with constant coefficients - Method of varia					
	s equation of Euler's and Legendre's type – System of simultaneous linear diffe ficients - Method of undetermined coefficients	erential equations with				
UNIT II	PARTIAL DIFFERENTIAL EQUATIONS	12				
	f partial differential equations – Singular integrals Solutions of standard type					
differential	equations – Lagrange's linear equation Linear partial differential equations on standard type					
UNIT III	FOURIER SERIES	12				
	onditions – General Fourier series – Odd and even functions – Half range sin -Harmonic Analysis.	e series – Half range				
UNIT IV	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	12				
dimensional	n of PDE – Method of separation of variables - Solutions of one dimensional wav equation of heat conduction – Steady state solution of two dimensional equation of sulated edges).					
UNIT V	LAPLACE TRANSFORMS	12				
coefficients.		OTAL: 60 PERIODS				
TEXT BOC		1.5.1				
<i>,</i>	val B.S., —Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43 szig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th E					
REFEREN						
1) Bali	N., Goyal M. and Watkins C., —Advanced Engineering Mathematics, Firewall M. shmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.	Media (An imprint of				
2) Jain						
3rd						
		cations, New Delhi ,				
3) OʻN	Edition, 2007. eil, P.V. —Advanced Engineering Mathematics ^{II} , Cengage Learning India Pvt., L ry, S.S, —Engineering Mathematics'', Vol. I & II, PHI Learning Pvt. Ltd, 4th Edit	cations, New Delhi , td, New Delhi, 2007.				
 3) O'N 4) Sast 2014 5) Wyl Ltd, 	Edition, 2007. eil, P.V. —Advanced Engineering Mathematics ^{II} , Cengage Learning India Pvt., L ry, S.S, —Engineering Mathematics'', Vol. I & II, PHI Learning Pvt. Ltd, 4th Edit	cations, New Delhi , td, New Delhi, 2007. tion, New Delhi, v Hill Education Pvt.				

2. Ms. P. S. Narmathadevi <u>narmathadevi@saveetha.ac.in</u>

L T PC 3 0 2 4

(COMMON TO CIVIL & MECHANICAL)

Preamble:

The goal of the course is to provide a sound knowledge in testing of hypothesis for small and large samples which plays an important role in real time engineering problems. The syllabus deals with the basic concepts of design of experiments which are essential in the field of agriculture and statistical quality control. This course aims to impart knowledge in Numerical methods for solution of system of equations, interpolation, differentiation and integration. The syllabus also provides the solution for some of these methods using PYTHON techniques.

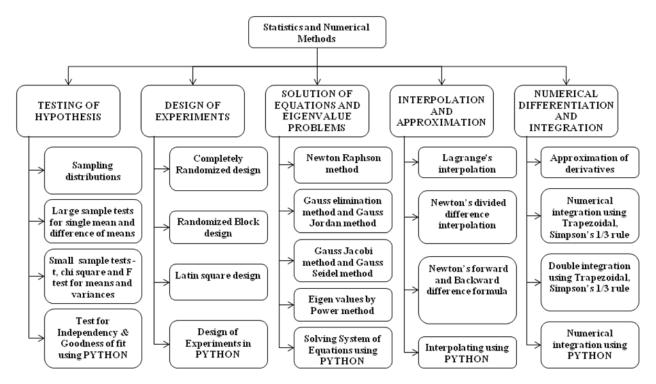
Prerequisite:

19MA201 - Calculus and Matrix Algebra

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.	Apply
CO3	Obtain solutions of algebraic and transcendental equations and solve linear system of equations using suitable numerical methods.	Understand
CO4	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values.	Apply
CO5	Evaluate derivatives and integrals using Numerical techniques.	Evaluate

							MI	ECH							
Course Outcomes		Program Outcomes													ecific s
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	-	-	-	-	-	-	-	1	3	3	2
CO2	3	3	2	1	-	-	-	-	-	-	-	1	3	3	2
CO3	3	3	2	-	-	-	-	-	-	-	-	1	3	2	2
CO4	3	3	3	1	-	-	-	-	-	-	-	1	3	2	2
CO5	3	2	1	1	-	-	-	-	-	-	-	-	3	2	2

3 - Strong; 2 - Medium; 1-Low



19MA211

STATISTICS AND NUMERICAL METHODS

L T P C 3 0 2 4

SYLLABUS

One way and two way classifications - Completely randomized design – Randomized block design – Latin squar design – One way and two way classifications using Python. Intervention UNT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12 Solution of algebraic and transcendental equations – Newton Raphson method. Solution of linear system o equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidal method using Python. 12 UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND 12 INTEGRATION 12 12 Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation oplynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration using Python. 12 UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12 Taylor's series method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations s. Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIOD TEXT BOOKS: 1 0 Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,7 th Edition, New Delhi, 2007. 20 Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,6 th Edition, New Delhi. 2	UNIT I	TESTING OF HYPOTHESIS	12		
One way and two way classifications - Completely randomized design – Randomized block design – Latin squar design – One way and two way classifications using Python. UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12 Solution of algebraic and transcendental equations – Newton Raphson method. Solution of linear system o equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidal method using Python. 12 UNIT IV INTEGRATION, NUMERICAL DIFFERENTIATION AND I2 12 INTEGRATION 12 10 Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration using Python. 12 UNT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12 Coloring first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. 12 TOTAL: 75 PERIOD 13 14 14 Coloring and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. 2) Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,7 th Edition, New Delhi, 2009 3) Gupta, S.C. and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics	distribution for means, variance	single mean and difference of means - Tests based on t, chi square and F distribe - Contingency table (Test for Independency)-Goodness of fit. Testing of small	outions for testing		
Image: Second	UNIT II	DESIGN OF EXPERIMENTS	12		
Solution of algebraic and transcendental equations – Newton Raphson method. Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method. Newtor Raphson and Gauss Seidal method using Python. UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND 12 INTEGRATION 12 Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration using Python. 12 UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL [2] 12 Faylor's series method - Euler's method - Modified Eulers's method - Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations. Runge-Kutta and Adams Bashforth' methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. C Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 7 th Edition, New Delhi, 2009 3) Guyta, S.C., and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed), Sultan Chand & Sons, New Delhi. Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES : 1. Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. SankaraRao. K., "Numerical methods of Scientists and Engineers", Prentice			ign – Latin square		
equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power method. Newtor Raphson and Gauss Seidal method using Python. UNIT IV INTEGRATION, NUMERICAL DIFFERENTIATION AND 12 INTEGRATION 12 Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration polynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation of ORDINARY DIFFERENTIAL EQUATIONS Taylor's series method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIODE TEXT BOOKS: 1) Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. 2) Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,7 th Edition, New Delhi, 2009 3) Gupta, S.C, and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed),Sultan Chand & Sons, New Delhi. 4) Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES : 1. Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. 2. SankaraRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India 3. Gerald. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asia,6 th Edition, New Delhi, 2006. 4. Jaan Kiusalaas, Numerical Methods in Engineering with Python, Cambridge University Press Th Edinburgh Building, Cambridge, UK., 2005 5. José Unpingco, Python for Probability,	UNIT III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	12		
INTEGRATION Lagrange's and Newton's divided difference interpolation – Newton's forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration using Python. UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12 Taylor's series method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIODS TEXT BOOKS: 1) Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. 2) Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,7 th Edition, New Delhi, 2009 3) Gupta, S.C. and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed),Sultan Chand & Sons, New Delhi. 4) 4) Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 5 REFERENCES : 1. Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. 5 2. SankaraRao, K., "Numerical Methods in Engineering with Python, Cambridge University Press Th Edinburgh Building, Cambridge, UK., 2005 5. José Unpingeo, Python for Probability, Statistics, and M	equations - Ga Gauss Seidel -	uss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Matrix Inversion by Gauss Jordan method - Eigen values of a matrix by Power	Gauss Jacobi and		
interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's rule. Interpolation and Numerical Integration using Python. UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS Taylor's series method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIODS TEXT BOOKS: 1) Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. 2) Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 7 th Edition, New Delhi, 2009 3) Gupta, S.C., and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed), Sultan Chand & Sons, New Delhi. 4) Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES : 1. Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. 2. SankaraRao. K., "Numerical methods in Engineering with Python, Cambridge University Press Th Edinburgh Building, Cambridge, UK., 2005 5. José Unpingco., Python for Probability, Statistics, and Machine Learning, Springer DOI 10.1007/978-3-319-30717-6, 2016	UNIT IV		12		
 EQUATIONS Taylor's series method – Euler's method – Modified Eulers's method – Fourth order Runge-Kutta method for solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIODS TEXT BOOKS: Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 7th Edition, New Delhi, 2009 Gupta, S.C., and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed), Sultan Chand & Sons, New Delhi. Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES: Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. Gerald. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asia, 6th Edition, New Delhi, 2009. 	interpolation .	Approximation of derivatives using interpolation polynomials - Numerical			
 solving first and second order equations – Adams Bashforth's predictor – corrector methods for solving first order equations . Runge-Kutta and Adams Bashforth' method using Python. TOTAL: 75 PERIODS TEXT BOOKS: Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 7th Edition, New Delhi, 2009 Gupta, S.C., and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed), Sultan Chand & Sons, New Delhi. Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES: SankaraRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Gerald. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asia,6th Edition, New Delhi. 4. Jaan Kiusalaas., Numerical Methods in Engineering with Python, Cambridge University Press Th Edinburgh Building, Cambridge, UK., 2005 José Unpingco., Python for Probability, Statistics, and Machine Learning, Springer DOI 10.1007/978-3-319-30717-6., 2016 	UNIT V		12		
 TEXT BOOKS: Grewal. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Publishers, 45th Edition, New Delhi, 2017. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia,7th Edition, New Delhi, 2009 Gupta, S.C, and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed),Sultan Chand & Sons, New Delhi. Kent D. Lee. (2014). Python Programming Fundamentals (2nd Ed), Springer DOI 10.1007/978-1-4471-6642-9 REFERENCES: Statistics and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. SankaraRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Gerald. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asia,6th Edition, Nev Delhi, 2006. Jaan Kiusalaas., Numerical Methods in Engineering with Python, Cambridge University Press Th Edinburgh Building, Cambridge, UK., 2005 José Unpingco., Python for Probability, Statistics, and Machine Learning, Springer DOI 10.1007/978-3-319-30717-6., 2016 	solving first an	d second order equations - Adams Bashforth's predictor - corrector methods for so			
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DOI 10.1007/978-3-319-30717-6., 2016	 Grew. 45th I Geral New I Gupta Sons, Kent DOI I 	 al. B.S., and Grewal. J.S., "Numerical methods in Engineering and Science", Khanna Edition, New Delhi, 2017. al. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, As Delhi, 2009 c. S.C., and Kapoor, V.K. (2004). Fundamental of Mathematical Statistics (11th Ed) New Delhi. D. Lee. (2014). Python Programming Fundamentals (2nd 0.1007/978-1-4471-6642-9 c. S.C. c. and Numerical Methods by T. Veerarajan & T Ramachandran- 29 Oct 2018. 	sia,7 th Edition,),Sultan Chand & Ed), Springer.		
Course Designers:	 Sanka Geral Delhi Jaan Edinb 	d. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asi 2006. Kiusalaas., Numerical Methods in Engineering with Python, Cambridge University Building, Cambridge, UK., 2005	a,6 th Edition, New versity Press The		
	 Sanka Geral Delhi Jaan Edinb José 	 d. C. F., and Wheatley. P. O., Applied Numerical Analysis, Pearson Education, Asi 2006. Kiusalaas., Numerical Methods in Engineering with Python, Cambridge University Building, Cambridge, UK., 2005 Unpingco., Python for Probability, Statistics, and Machine Lea 	a,6 th Edition, New versity Press The		

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- 2. Mr.K.Thirumalai thirumalai@saveetha.ac.in



Department of Medical Electronics Engineering

S. No	Sub. Code	Sub. Title	Cat	L	Т	Р	С	Hours Split	Pre-requisite
1	19MA202	Calculus and Laplace Transforms*	BS	3	1	0	4	2-2	-
2	19MA204	Complex Variables and Ordinary Differential Equations*	BS	3	1	0	4	2-2	19MA202
3	19MA213	Linear Algebra and Numerical Methods	BS	3	1	0	4	2-2	19MA202
4	19MA217	Random Processes and Statistics	BS	3	1	0	4	2-2	19MA202

Note:

*Exempted for Lateral Entry Students

(COMMON TO BIO MED, ECE, EEE, EIE & MED ELEC)

Preamble:

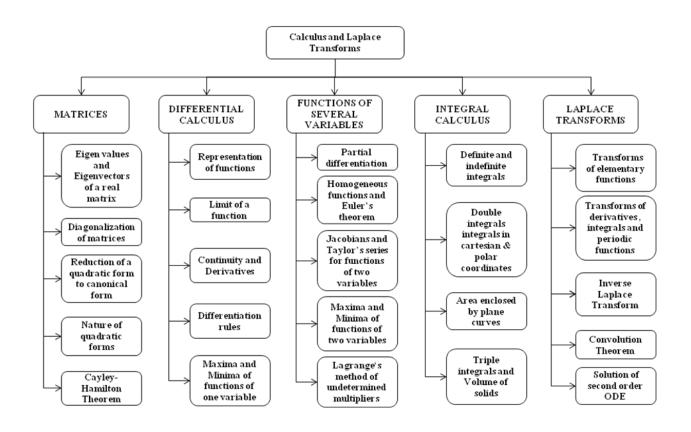
The objective of this course is to achieve conceptual understanding and to retain the best traditions of calculus. This is a foundation course which mainly deals with topics such as matrices, single variable and multivariable calculus and plays an important role in the understanding of science, engineering and computer science, among other disciplines. The syllabus also includes Laplace transforms in which various methods can be used to transform the time domain circuits to frequency domain to simplify the solution of differential equations.

Prerequisite: NIL

CO1	Develop the use of matrix algebra techniques which is needed by engineers for practical applications	Analyze
CO2	Apply the various differentiation concepts in model problems and to obtain maxima and minima for a given function.	Apply
CO3	Evaluate maxima and minima for a given function with several variables by finding stationary points.	Evaluate
CO4	Acquire sound knowledge of techniques in integral calculus and apply the necessary tools in evaluating multiple integrals which are used to solve model engineering problems.	Apply
CO5	Evaluate Laplace transforms of elementary functions and apply those concepts in solving linear second order ordinary differential equations with constant coefficients.	Evaluate

	MED ELEC														
Course Outcomes		Program Outcomes Program Specific Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	3	2	1	-	-	-	-	-	-	-	1	3	2	
CO2	3	3	2	-	-	-	-	-	-	-	-	1	2	2	
CO3	3	2	2	-	-	-	-	-	-	-	-	1	2	1	
CO4	3	3	2	1	-	-	-	-	-	-	-	1	3	1	
CO5	2	3	2	1	-	-	-	-	-	-	-	-	3	2	

3 - Strong; 2 - Medium; 1-Low



SYLLABUS

UNIT I	MATRICES	12				
 Cayley-Hamil 	d Eigenvectors of a real matrix – Characteristic equation – Properties of ton theorem – Diagonalization of matrices – Reduction of a quadr formation – Nature of quadratic forms.					
UNIT II	DIFFERENTIAL CALCULUS	12				
Representation of functions of o	of functions - Limit of a function - Continuity - Derivatives - Differe one variable.	ntiation rules -Maxima and Minim				
UNIT III FUNCTIONS OF SEVERAL VARIABLES						
	ation – Homogeneous functions and Euler's theorem – Total derivatives for functions of two variables – Maxima and minima of functions of multipliers.					
UNIT IV	INTEGRAL CALCULUS	12				
	definite integrals - Double integrals – Double integrals in polar coo	ordinates – Area enclosed by plan				
	Integrals – Volume of solid					
		12				
curves – Triple i UNIT V Existence condit Basic properties transforms – Co	integrals – Volume of solid	12 Function and unit impulse function l and final value theorems – Invers				
curves – Triple i UNIT V Existence condit Basic properties transforms – Co	Integrals – Volume of solid LAPLACE TRANSFORMS tions – Transforms of elementary functions – Transform of unit step f – Shifting theorems -Transforms of derivatives and integrals – Initiation volution theorem – Transform of periodic functions – Application	12 Function and unit impulse function l and final value theorems – Invers				
curves – Triple i UNIT V Existence condit Basic properties transforms – Co ordinary differer TEXT BOOKS 1. Grewal B 2. Kreyszig.	Integrals – Volume of solid LAPLACE TRANSFORMS tions – Transforms of elementary functions – Transform of unit step f – Shifting theorems -Transforms of derivatives and integrals – Initial onvolution theorem – Transform of periodic functions – Application ntial equations with constant coefficients.	12 Function and unit impulse function 1 and final value theorems – Inverse n to solution of linear second order TOTAL: 60 PERIOD thi, 43rd Edition, 2015. e, 10th edition, 2015.				
curves – Triple i UNIT V Existence condit Basic properties transforms – Co ordinary differer TEXT BOOKS 1. Grewal B 2. Kreyszig. 3. Sanjay M REFERENCES 1. Anton, H, 2. Jain R.K. 2016. 3. Narayana Chennai, 4. Srimantha	Integrals – Volume of solid LAPLACE TRANSFORMS tions – Transforms of elementary functions – Transform of unit step f – Shifting theorems -Transforms of derivatives and integrals – Initia onvolution theorem – Transform of periodic functions – Application ntial equations with constant coefficients. : .S., —Higher Engineering Mathematics, Khanna Publishers, New Del E Advanced Engineering Mathematics, John Wiley & Sons. Singapore ishra, Fundamentals of Mathematics Differential Calculus, Pearson Ed S: , Bivens, I and Davis, S, Calculus, Wiley, 10th Edition, 2016. and Iyengar S.R.K., Advanced Engineering Mathematics, Narosa Pub n, S. and Manicavachagom Pillai, T. K., Calculus Volume I and II, S.	12 Function and unit impulse function 1 and final value theorems – Inverse 1 to solution of linear second order TOTAL: 60 PERIOD thi, 43rd Edition, 2015. e, 10th edition, 2015. ducation India, June 2016. plications, New Delhi, 5th Edition, Viswanathan Publishers Pvt. Ltd., Press, 2015.				
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(COMMON to ECE, BME & MED ELEC)

Preamble:

This course is designed to cover topics such as Vector Calculus, Complex Analysis, Sequences and series. Vector calculus and differential equations can be widely used for modeling the various laws of physics. The syllabus includes concepts of analytic functions which are applied to evaluate Contour Integrals.

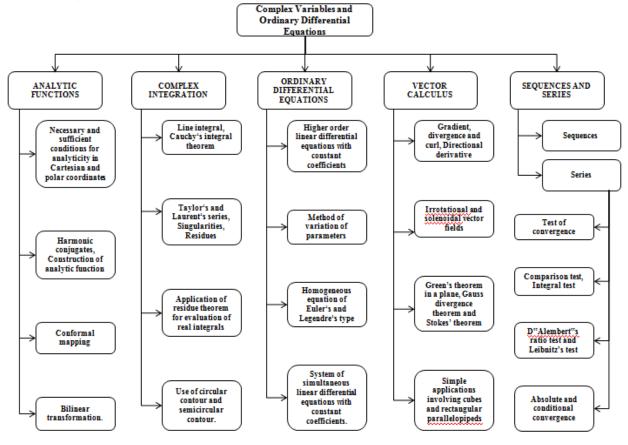
Prerequisite:

19MA202 - Calculus and Laplace Transforms

CO1	Identify and construct analytic functions and conformal mapping.	Apply
CO2	Understand the fundamental concepts of complex analysis and apply them to evaluate contour integrals.	Apply
CO3	Analyze various techniques in solving ordinary differential equations.	Analyze
CO4	Determine the vector differentiation and vector integration.	Evaluate
CO5	Test the convergene of infinite series and evaluate the limits.	Evaluate

	MED ELEC													
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	1
CO4	3	3	1	1	-	-	-	-	-	-	-	-	2	2
CO5	3	2	1	1	-	-	-	-	-	-	-	1	2	1

3 – Strong; 2 – Medium; 1-Low



SYLLABUS

UNIT I ANALYTIC FUN		12
	nd sufficient conditions for analyticity in C s – Construction of analytic function – Cor	
UNIT II COMPLEX INT		12
Line integral - Cauchy's integral t	theorem – Cauchy's integral formula – Tay ie theorem – Application of residue theorem	
UNIT III ORDINARY DI	FFERENTIAL EQUATIONS	12
	quations with constant coefficients - Metho and Legendre's type – System of simultan nts.	
UNIT IV VECTOR CALC	CULUS	12
integration - Green's theorem in a	Directional derivative – Irrotational and sol- a plane, Gauss divergence theorem and Sto olving cubes and rectangular parallelopipe	okes' theorem (excluding
UNIT V SEQUENCES A	ND SERIES	12
	ntegral test and D"Alembert"s ratio test – A tive terms – Absolute and conditional conv	
Publications Pvt Ltd., 201	yal, "A Text book of Engineering Mathema 1 gineering Mathematics", 43rd Edition, Kha ngineering Mathematics", Tata McGraw Hi	
3) Ramana B.V, "Higher En		
 3) Ramana B.V, "Higher End Delhi, 1st Edition, 2017. REFERENCES : Dass, H.K., and Er. R 2011 Peter V. O"Neil," Adv 	Rajnish Verma," Higher Engineering Mathe wanced Engineering Mathematics", 7th Ed as P. and C.Vijayakumari, "Engineering Ma	Il Publishing Company, New ematics", S. Chand Private Ltd. ition, Cengage learning, 2012.
 3) Ramana B.V, "Higher End Delhi,1st Edition ,2017. REFERENCES : Dass, H.K., and Er. R Dass, H.K., and Er. R 2) Peter V. O"Neil," Adv 3) Sivarama Krishna Da 	Rajnish Verma," Higher Engineering Mathe wanced Engineering Mathematics", 7th Ed as P. and C.Vijayakumari, "Engineering Ma	Il Publishing Company, New ematics", S. Chand Private Ltd. ition, Cengage learning, 2012.
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(COMMON to ECE & MED ELEC)

Preamble:

This course is designed to introduce the basic notions of groups, rings, fields which will then be used to solve related problems. The syllabus provides the basic concepts of vector spaces, linear transformations and inner product spaces. The course includes the concepts of numerical techniques to solve system of linear equations and to interpolate the missing data in a given range.

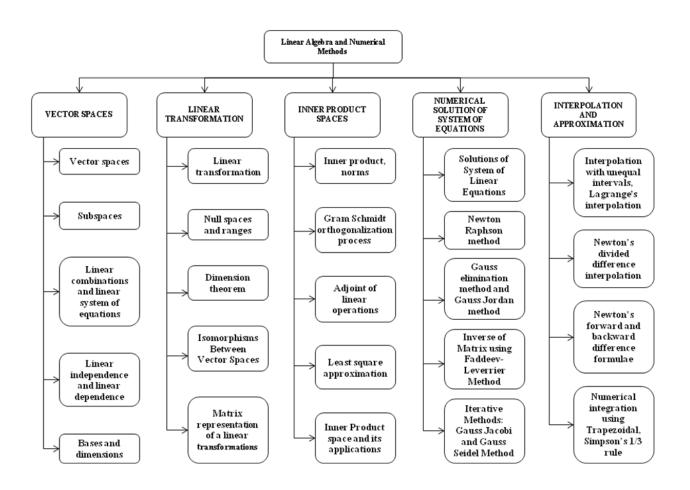
Prerequisite:

19MA202 - Calculus and Laplace Transforms

CO1	Understand the concepts of vector spaces.	Understand
CO2	Understand the concepts of vector space, linear transformations and diagonalization	Understand
CO3	Apply the concept of inner product spaces in orthogonalization.	Apply
CO4	Analyze suitable numerical techniques for solving system of linear equations.	Analyze
CO5	Apply interpolation in constructing approximate polynomial to represent the data and to find the intermediate values	Apply

	MED ELEC													
Course Outcomes		Program Outcomes Program Specific Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	-	-	-	-	-	1	3	2
CO2	3	1	2	-	-	-	-	-	-	-	-	1	3	2
CO3	2	1	2	-	-	-	-	-	-	-	-	1	3	-
CO4	3	2	2	2	-	-	-	-	-	-	-	1	3	1
CO5	3	2	3	2	-	-	-	-	-	-	-	1	3	1

3 – Strong; 2 – Medium; 1-Low Concept Map:



LTPC

3 1 0 4

SYLLABUS

UNIT I	VECTOR SPACES	12
	s – Subspaces – Linear combinations and linear system of equa e and linear dependence – Bases and dimensions.	tions – Linear
UNIT II	LINEAR TRANSFORMATION	12
	rmation - Null spaces and ranges - Dimension theorem - Isomorphism's representation of a linear transformations.	Between Vector
UNIT III	INNER PRODUCT SPACES	12
	norms - Gram Schmidt orthogonalization process - Bessel's Inequality, Par ear operations - Least square approximation- Inner Product space and its app	
UNIT IV	NUMERICAL SOLUTION OF SYSTEM OF EQUATIONS	12
method-Gauss	ystem of Linear Equations- Newton Raphson method, Solutions to linear elimination method- Pivoting - Gauss Jordan method - Inverse of Matrix nod - Iterative Method - Gauss Jacobi and Gauss Seidel Method.	
UNIT V	INTERPOLATION AND APPROXIMATION	12
interpolation -	with unequal intervals - Lagrange's interpolation – Newton's div Interpolation with equal intervals - Newton's forward and backward diffe egration using Trapezoidal, Simpson's 1/3 rule.	
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Editior		

Course Designers:

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 kamalakannan@saveetha.ac.in
- 2. Mr L.Vigneswaran vigneswaranl@saveetha.ac.in

L	Т	P	С	
3	1	0	4	

(COMMON TO ECE, BIO-MED & MED-ELEC)

Preamble :

This course is designed to cover the concepts of probability distributions, random processes and spectral densities for applications such as random signals, digital signal processing etc in communication engineering. The syllabus also covers the techniques of hypothesis testing for small and large samples which plays an important role in real life problems.

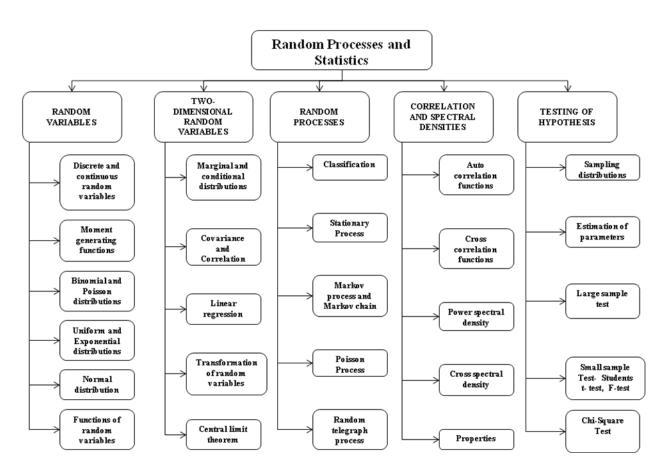
Prerequisite :

19MA202 - Calculus and Laplace Transforms

CO1	Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.	Understand
CO2	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	Apply
CO3	Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	Analyze
CO4	Evaluate functional relationship between random inputs and outputs with the use of Random Process Techniques.	Evaluate
CO5	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply

	MED ELEC													
Course Outcomes		Program Outcomes											Program Specific Outcomes	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	-	1	3	2
CO2	3	2	1	2	-	-	-	-	-	-	-	1	3	2
CO3	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO4	3	3	2	1	-	-	-	-	-	-	-	1	2	-
CO5	3	2	1	1	-	-	-	-	-	-	-	1	3	1

3-Strong; 2-Medium; 1-Low



L T PC 3 1 0 4

SYLLABUS

UNIT I	RANDOM VARIABLES	12
	bles - Discrete and continuous random variables - Moments - Moment g	
	Poisson, Geometric, Uniform, Exponential and Normal distributions- Fu	inctions of random
variables.	I	
UNIT II	TWO - DIMENSIONAL RANDOM VARIABLES	12
	ions – Marginal and conditional distributions – Covariance – Correlation a	
•	Transformation of random variables – Central limit theorem (for independe	nt and identically
	ndom variables).	10
UNIT III	RANDOM PROCESSES	12
	- Stationary process - Markov process - Markov chain - Poisson p	process – Random
telegraph pro		10
UNIT IV	CORRELATION AND SPECTRAL DENSITIES	12
	on functions – Cross correlation functions – Properties – Power spectral de	ensity –Cross
2	ty – Properties.	10
UNIT V	TESTING OF HYPOTHESIS	12
	ributions – Estimation of parameters – Statistical hypothesis - Large saturation for single mean and difference of means - Tests based on t and	
	, variances and proportion - Chi-square test- Contingency table (Test for I	ndependency)
testing means	, variances and proportion – Chi-square test- Contingency table (Test for I TOT	
testing means	, variances and proportion – Chi-square test- Contingency table (Test for I TOT	ndependency) AL: 60 PERIODS
TEXT BOOI 1. Peebles	, variances and proportion – Chi-square test- Contingency table (Test for I TOT XS:	ndependency) AL: 60 PERIODS
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Course Designers:

1. Ms. K. Ruth Isabelsruthisabels@saveetha.ac.in

2. Ms. V. Kavitha <u>kavithav@saveetha.ac.in</u>



Autonomous Syllabus

OFFERED BY

Department of Mathematics

UG Open Electives

(Common to all Departments)

	UG Open Electives													
S. No	Sub. Code	Sub. Title	Departments	Cat	L	Т	Р	С	Hours Split	Pre- requisite				
1	19MA601	Resource Management Techniques	Common to All	UG Elective	3	0	0	3	2-1	-				
2	19MA602	Statistics for Engineers	Common to All	UG Elective	3	0	0	3	2-1	-				

(COMMON TO ALL)

Preamble :

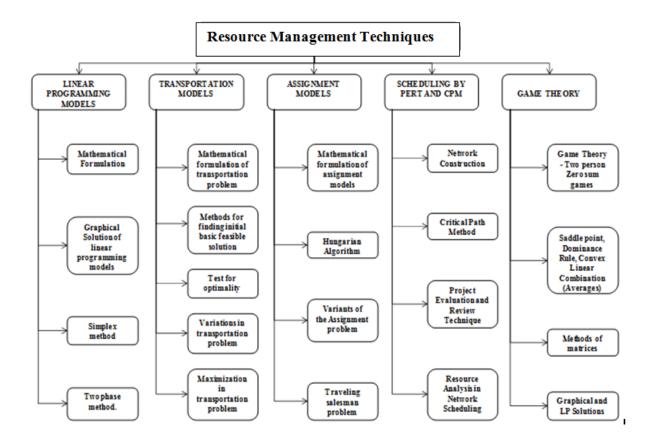
The course is designed to identify situations in which linear programming techniques can be applied. It helps to understand basic concepts and general mathematical structure of a LPP model. The syllabus helps to examine multiple optimal solutions and prohibited routes in the transportation and assignment problems. The objective of PERT and CPM is to schedule activities associated with any project in an efficient manner.

Prerequisite: NIL

CO1	Apply simplex method to solve optimization problems	Apply
CO2	Analyze and formulate a transportation problem involving a large number of shipping routes.	Analyze
CO3	Understand the features of assignment problems.	Understand
CO4	Construct network diagrams of activities involved in a project management using PERT and CPM techniques.	Create
CO5	Analyze the game theory techniques in mathematical models of strategic interaction between rational decision-makers.	Analyze

Course Outcomes	Program Outcomes													
	PO1	PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12												
CO1	3	2	3	-	-	-	-	-	-	1	1	2		
CO2	3	2	3	-	-	2	2	-	-	1	1	2		
CO3	3	2	3	-	-	2	2	-	-	1	1	2		
CO4	3	2	3	-	-	3	2	-	-	1	1	2		
CO5	3	2	3	-	-	-	-	-	-	1	1	2		

3-Strong; 2-Medium; 1-Low



LTPC

SYLLABUS

UNIT I	LINEAR PROGRAMMING MODELS	9
	al Formulation - Graphical Solution of linear programming models - vo phase method.	– Simplex
UNIT II	TRANSPORTATION MODELS	9
	al formulation of transportation problem- Methods for finding initial st for optimality- Variations in transportation problem – Maximizat n problem.	
UNIT III	ASSIGNMENT MODELS	9
	al formulation of assignment models -Hungarian Algorithm – Varia problem – Traveling salesman problem.	nts of the
UNIT IV	SCHEDULING BY PERT AND CPM	9
	nstruction – Critical Path Method – Project Evaluation and Review alysis in Network Scheduling.	Technique –
UNIT V	GAME THEORY	9
Combination		L: 45 PERIODS
Educ	Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", ation, Asia, 2005.	Pearson
Delh	Kumar Gupta, D.S. Hira, "Operations Research", S.Chand & Com i, 3rd Edition, 2008.	· ·
Com	W. Chinneck "Feasibility and Infeasibility in Optimization Algorith putational Methods' Springer, 2008.	
John	ndran, Phillips, Solberg, "Operations Research: Principles And Prac Wiley & Sons, 01-Jul-2007	
India	D.C. "Fundamentals of Applied Probability and Random Processes", Elsev n Reprint, 2007	/ier, U.P., 1st
Course Desi	gners:	
1 K Ru	th Isabels ruthisabels@saveetha.ac.in	

1.	K. Ruth Isabels	ruthisabels@saveetha.ac.in

2. Dr.V.Anandan <u>anandanviswanathan@saveetha.ac.in</u>

3 0 0 3

(COMMON TO ALL)

Preamble:

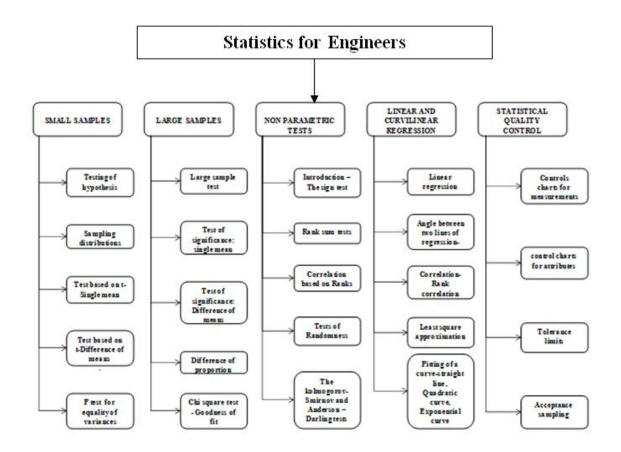
The goal of the course is to provide an in depth knowledge about sampling, regression analysis and quality control. The main objective of many statistical investigations is to make predictions preferably on the basis of mathematical equations. This course aims at providing the required skill to apply the statistical tools in engineering problems. The syllabus also provides special techniques of quality assurance..

Prerequisite: NIL

CO1	Understand the various applications of t and F distributions in statistics and the relationship between them.	Understand
CO2	Demonstrate the concepts of parameter, statistic and their utility in large sample tests.	Apply
CO3	Understand various methods of non parametric tests and concepts related to testing of hypothesis.	Understand
CO4	Appreciate the use of regression analysis for estimation and prediction purposes.	Apply
CO5	Develop the notion of sampling distributions and statistical quality control in production field.	Create

Course Outcomes						Progra	m Outco	omes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	-	-	-		-	-	1	1	2
CO2	3	2	3	-	-	-		-	-	1	1	2
CO3	3	2	3	-	-	-		-	-	1	1	2
CO4	3	2	3	-	-	-		-	-	1	1	2
CO5	3	2	3	-	-	-		-	-	1	1	2

3-Strong; 2-Medium; 1-Low



LTPC

SYLLABUS

UNIT I	SMALL SAMPLES	9
	pothesis-Introduction –Sampling distributions –Estimation of parameters- te difference of means- F test for equality of variances.	est based on t –
UNIT II	LARGE SAMPLES	9
mean- differe	pothesis-Introduction- Large sample test-Parameter and statistic – Test of sigence of means-single proportion – difference of proportion- Chi square test – independency of attributes.	
UNIT III	NON PARAMETRIC TESTS	9
	-The sign test- Rank sum tests – Correlation based on Ranks – Tests of R - Smirnov and Anderson –Darling tests.	andomness- The
UNIT IV	LINEAR AND CURVILINEAR REGRESSION	9
lines of regre	Linear regression- Regression coefficients –properties of regression- Angle ession- Correlation- Rank correlation –curvilinear regression curves – Fitting Quadratic curve, Exponential curve.	
UNIT V	STATISTICAL QUALITY CONTROL	9
Controls cha	rts for measurements (X and R Charts) - control charts for attributes (p,c	and np charts) -
Tolerance lin	nits – Acceptance sampling.	
TEXT BOO	TOTA KS:	L: 45 PERIODS
TEXT BOO 1) Johns Pears 2) S.C. G	TOTA KS: on, R.A., Miller, I and Freund J., Miller and Freund's""Probability and St on Education, Asia, 8 th Edition, 2015. Supta , V. K. Kapoor, "Fundamentals of Mathematical Statistics" Sultan Cha	atistics for Engir
TEXT BOO 1) Johns Pears 2) S.C. G 11 th R	TOTA KS: on, R.A., Miller, I and Freund J., Miller and Freund's'"Probability and St on Education, Asia, 8 th Edition, 2015.	atistics for Engir
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Autonomous Syllabus

OFFERED BY

Department of Mathematics PG Courses

136

	PG PAPERS									
S. No	Sub. Code	Sub. Title	Departments	Cat	L	Т	Р	С	Hours Split	Pre- requisite
1	19MMA01	Applied Mathematics for Electronics Engineers	ME (AE & VLSI)	BS	3	1	0	4	2-2	-
2	19MMA02	Applied Mathematics for Communication Engineers	ME (CN)	BS	3	1	0	4	2-2	-
3	19MMA03	Applied Mathematics for Engineers	ME (CAD / CAM)	BS	3	1	0	4	2-2	-
4	19MMA04	Applied Probability and Statistics	ME (CSE & SE)	BS	3	1	0	4	2-2	-
5	19MMA05	Linear Algebra and Number Theory	ME (CSE)	PG Elective	3	1	0	4	2-2	-
6	19MMA06	Applied Mathematics for Electrical Engineers	ME (EST)	BS	3	1	0	4	2-2	-

(COMMON TO M.E AE & VLSI)

Preamble:

The goal of this course is to demonstrate various analytical skills in applied mathematics and extensive experience with the tactics of problem solving and logical thinking applicable in electronics engineering. This course also will help the students to solve problems in electronics engineering using mathematical tools from several mathematical areas, including fuzzy logic, matrix theory, probability, dynamic programming and queuing theory.

Prerequisite: NIL

CO1	Understand the concepts of Fuzzy logic, Fuzzy propositions and Fuzzy quantifiers.	Apply
CO2	Apply various methods in matrix theory for matrix decomposition and solving system of linear equations.	Apply
CO3	Evaluate probability and moments in standard distributions of discrete and continuous random variables	Evaluate
CO4	Analyze the principle of optimality, formulation and computational procedure of dynamic programming.	Analyze
CO5	Analyze a network of queues with Poisson external arrivals, Exponential service requirements and independent routing.	Analyze

Course Outcomes: At the end of the course learners will be able to:

SYLLABUS

UNIT I	FUZZY LOGIC	12		
Classical logic –	Multivalued logics – Fuzzy propositions – Fuzzy quantifiers.			
UNIT II	MATRIX THEORY	12		
•	nposition - Generalized Eigenvectors - Canonical basis - QR fac - Singular value decomposition.	etorization - Least		
UNIT III	PROBABILITY AND RANDOM VARIABLES	12		
Probability – Axioms of probability – Conditional probability – Baye's theorem - Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a Random variable.				
UNIT IV	DYNAMIC PROGRAMMING	12		
Dynamic programming – Principle of optimality – Forward and backward recursion – Applications of dynamic programming – Problem of dimensionality.				
UNIT V	QUEUEING MODELS	12		
	– Markovian queues – Single and multi-server models – Little's f lel – Steady state analysis – Self-service queue.	formula - Machine		
	TOT	AL: 60 PERIODS		
REFERENCES):			
 I) Johnson, R.A., Miller, I and Freund J., "Miller and Freund"s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015. 2) Taha, H.A., "Operations Research: An Introduction", 9th Edition, Pearson Education, Asia, New Delhi, 2016. 				

Course Designers:

- 1. Dr.J.Joy Priscilla
- 2. Ms.V.N.Jayamani

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(For M.E CN)

Preamble:

The goal of this course is to demonstrate various analytical skills in applied mathematics for problem solving and logical thinking applicable in communication engineering. The syllabus is design to identify, formulate and solve problems in electronics engineering using mathematical tools from several mathematical fields, including linear algebra, matrix linear programming, probability, numerical solution of ordinary differential equations and queueing models.

Prerequisite: NIL

CO1	Understand the concepts of vector space, linear transformations, eigenvalues and matrix decomposition.	Understand
CO2	Apply suitable optimization techniques for solving linear programming models.	Apply
CO3	Evaluate the numerical solution of differential equations by single and multistep methods.	Evaluate
CO4	Understand the concepts of probability and random variables and apply them to evaluate correlation and regression between variables.	Apply
CO5	Understand the characteristic features of a queuing system and acquire skills in analyzing queuing models.	Analyze

Course Outcomes: At the end of the course learners will be able to:

SYLLABUS

UNIT I	LINEAR ALGEBRA	12
Generalized	s – Norms – Inner products – Eigenvalues using QR transformations – QR f eigenvectors – Canonical forms – Singular value decomposition and a se – Least square approximations - Toeplitz matrices and some applications.	pplications -
UNIT II	LINEAR PROGRAMMING	12
	– Graphical solution – Simplex method – Big M method - Two pha n problems - Assignment models.	ise method -
UNIT III	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	12
Adams - Basl	a method of fourth order for system of IVPs - Numerical stability of Runge hforth multistep method - Shooting method, BVP : Finite difference method orthogonal collocation method.	
UNIT IV Probability -	PROBABILITY AND RANDOM VARIABLES - Axioms of probability – Conditional probability – Baye's theorem	12
Probability - variables - Pr and condition Correlation.	- Axioms of probability – Conditional probability – Baye's theoren robability function - Two dimensional random variables - Joint distributior nal distributions – Functions of two dimensional random variables – Regre	n - Random as – Marginal ssion curve –
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce	- Axioms of probability – Conditional probability – Baye's theoren robability function - Two dimensional random variables - Joint distribution	n - Random as – Marginal ssion curve – 12
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution al distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. 	n - Random as – Marginal ssion curve – 12
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce interference r	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution hal distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. 	n - Random ns – Marginal ssion curve – <u>12</u> 11a - Machine
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce interference r	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution hal distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. TO 	n - Random ns – Marginal ssion curve – <u>12</u> 11a - Machine TAL: 60 PERIO
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce interference r	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution hal distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. TO and Faires, J. D., "Numerical Analysis ", 9th Edition, Cengage Learning, 201 rtle, J.F., Thompson, J. M. and Harris, C. M., "Fundamentals of Queueing T 	n - Random ns – Marginal ssion curve – 12 ala - Machine TAL: 60 PERIO
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce interference r EFERENCES Burden, R. C. a Gross, D., Sho ition, Wiley, 2 ohnson, R.A.,	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution hal distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. TO and Faires, J. D., "Numerical Analysis ", 9th Edition, Cengage Learning, 201 rtle, J.F., Thompson, J. M. and Harris, C. M., "Fundamentals of Queueing T 	n - Random ns – Marginal ssion curve – <u>12</u> 1la - Machine TAL: 60 PERIO 6. 'heory 4 th
Probability - variables - Pr and condition Correlation. UNIT V Poisson Proce interference r EFERENCES Burden, R. C. a Gross, D., Sho ition, Wiley, 2 ohnson, R.A., arson Education Course Des	 Axioms of probability – Conditional probability – Baye's theorem robability function - Two dimensional random variables - Joint distribution hal distributions – Functions of two dimensional random variables – Regre QUEUEING MODELS ess – Markovian queues – Single and multi - server models – Little's formunodel – Steady state analysis – Self-service queue. TO : and Faires, J. D., "Numerical Analysis ", 9th Edition, Cengage Learning, 201 rtle, J.F., Thompson, J. M. and Harris, C. M., "Fundamentals of Queueing T 2014. Miller, I and Freund J., "Miller and Freund"s Probability and Statistics for on, Asia, 8th Edition, 2015. 	n - Random ns – Marginal ssion curve – <u>12</u> 1la - Machine TAL: 60 PERIO 6. 'heory 4 th

19MMA03	Applied Mathematics for Engineers	LTPC
		4004

(FOR M.E CAD / CAM)

Preamble:

This course is designed to enrich the knowledge in various advanced mathematical techniques such as matrix theory, calculus of variations, probability and random variables, Laplace transforms and Fourier transforms. The fundamental concepts in these areas will be more useful for the students to model the engineering problems and solving them by applying these methods.

Prerequisite: NIL

CO1	Apply various methods in matrix theory to solve system of linear equations.	Apply
CO2	Maximize and minimize the functional that occur in various branches of engineering disciplines.	Evaluate
CO3	Compute probability and moments in standard distributions of discrete and continuous random variables.	Evaluate
CO4	Apply Laplace transforms in solving initial, boundary value problems and Partial Differential Equations.	Apply
CO5	Analyze the techniques of Fourier transforms in solving partial differential equations.	Analyze

Course Outcomes: At the end of the course learners will be able to:

19MMA03	Applied Mathematics for Engineers	L T P C
		4004

SYLLABUS

UNIT I	MATRIX THEORY	12			
The Cholesky decomposition - Generalized Eigenvectors - Canonical basis - QR factorization - Least squares method - Singular value decomposition.					
UNIT II	CALCULUS OF VARIATIONS	12			
higher orde Variational and Kantor	variation and its properties – Euler's equation – Functional dependant on firs r derivatives – Functionals dependant on functions of several independent variab problems with moving boundaries – Isoperimetric problems - Direct methods : ovich methods.	oles – Ritz			
UNIT III	PROBABILITY AND RANDOM VARIABLES	12			
variables - I Binomial,	Probability – Axioms of probability – Conditional probability – Baye's theorem - Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a random variable.				
UNIT IV	LAPLACE TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS	12			
Dirac delta	Laplace transform - Definitions - Properties – Transform error function - Bessel's function - Dirac delta function - Unit step functions – Convolution theorem – Inverse Laplace transform: Complex inversion formula – Solutions to partial differential equations: Heat equation - Wave				
UNIT V	FOURIER TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS	12			
•	functions - Dirac delta function – Convolution theorem – Parseval's ident partial differential equations: Heat equation - Wave equation - Laplace and Poi	2			
	TOTAL: 60 PERI	ODS			
REFEREN	ICES:				
1. James, 0 2004.	G., "Advanced Modern Engineering Mathematics ", 3 rd Edition, Pearson Education	on,			
2. Johnsor	n, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for	or			

 Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

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2.	Mr.K.Thirumalai	thirumalai@saveetha.ac.in

19MMA04	Applied Probability and Statistics	L T P C
		4004

(COMMON TO M.E CSE & SE)

Preamble:

The course is designed to provide the solid foundation in applied probability and various statistical methods which form the basis for other areas in the mathematical sciences including statistics and modern optimization methods. It is framed to address the issues and the principles of estimation theory, testing of hypothesis and multivariate analysis.

Prerequisite: NIL

Course Outcomes: At the end of the course learners will be able to:

CO1	Understand discrete and continuous random variables and their applications in computing	Understand
CO2	Identify various distribution functions and help in acquiring skills in handling situations involving more than one variable.	Understand
CO3	Evaluate Consistency, efficiency, estimators and analyze the maximum likelihood estimation.	Evaluate
CO4	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Apply
CO5	Perform exploratory analysis of multivariate data, such as multivariate normal density, calculate descriptive statistics and test for multivariate normality.	Analyze

19MMA04	Applied Probability and Statistics	LTPC
		4004

SYLLABUS

UNIT I	PROBABILITY AND RANDOM VARIABLES	12
Probability fur	xioms of probability – Conditional probability – Baye's theorem - Rando ction – Moments – Moment generating functions and their properties – B etric, Uniform, Exponential, Gamma and Normal distributions – Function	inomial,
UNIT II	TWO DIMENSIONAL RANDOM VARIABLES	12
	ons – Marginal and conditional distributions – Functions of two dimensio gression curve – Correlation	nal random
UNIT III	ESTIMATION THEORY	12
	nators – Method of moments – Maximum likelihood estimation - y principle of least squares – Regression lines.	
UNIT IV	TESTING OF HYPOTHESIS	12
	ibutions – Type I and Type II errors – Small and large samples – Tests bas F distributions for testing of mean, variance and proportions – Tests for i goodness of fit.	
UNIT V	MULTIVARIATE ANALYSIS	12
	rs and matrices – Mean vectors and covariance matrices – Multivariate no Principal components - Population principal components – Principal com ariables	•
	ΤΟΤΑ	AL: 60 PERIOD
REFERENCE	S:	
1.Johnson, R.A Engineers",	A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics Pearson Education, Asia, 9th Edition, 2017. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGr.	for

4. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 6 th Edition, New Delhi, 2016.

- 1. Ms.N.Jegajothi jegajothi@saveetha.ac.in
- 2. Mr.H.Prathab prathab@saveetha.ac.in

19MMA05	Linear Algebra and Number Theory	LTPC
171/11/11/00	Emical Angesta and Manser Theory	4 0 0 4

(ELECTIVE FOR ME CSE)

Preamble:

The general theory of mathematical systems involving addition and scalar multiplication has the applications to many areas of computer science. Mathematical systems of this form are called Vector spaces or linear spaces. Number theory deals with various applications such as encrypting and decrypting messages, algorithms for finding GCD of integers and concept of modular arithmetic in generating Pseudo random numbers.

Prerequisite: NIL

Course Outcomes: At the end of the course learners will be able to

CO 1	Understand the fundamental concepts of vector space.	Understand
CO 2	Analyze the concepts of linear transformations and diagonalization	Analyze
CO 3	Apply the concept of inner product spaces in orthogonalization.	Apply
CO 4	Apply the concepts of modular arithmetic in appropriate Computer Science and Engineering applications like pseudo- random number generation, encryption and decryption of messages.	Apply
CO 5	Analyze the concepts of congruence, primes and co-primes in multiplicative functions	Analyze

19MMA05	Linear Algebra and Number Theory	LTPC
		4 0 0 4

1

SYLLABUS

UNI	IT I VECTOR SPACES	12
	spaces – Subspaces – Linear combinations and linear system of e ear dependence – Bases and dimensions.	quations – Linear independence
UNI	T II LINEAR TRANSFORMATION	12
	r transformation - Null spaces and ranges - Dimension theorem - Mormations - Eigenvalues and eigenvectors - Diagonalizability.	Atrix representation of a linear
UNIT	T III INNER PRODUCT SPACES	12
-	product, norms - Gram Schmidt orthogonalization process - Adjoir approximation	t of linear operations - Least
UNIT	T IV THE FUNDAMENTALS OF INTEGERS	12
	on algorithm – Number patterns – Prime and composite numbers – mental theorem of arithmetic – LCM.	GCD – Euclidean algorithm –
i unuun		
UNI Linear I Wilsor	DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's	hinese remainder theorem -
UNI Linear Wilsor function	DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons.	hinese remainder theorem -
UNI Linear Wilsor function	DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's	hinese remainder theorem - Phi functions – Tau and Sigma
UNI Linear I Wilsor function	DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons.	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOD
UNI Linear Wilsor function REFEI 1)	T V DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons. RENCES: Kolman, B. Hill, D.R., Introductory Linear Algebral, Pears	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOD on Education, First Reprint,
UNI Linear I Wilsor function REFEI 1) 2)	T V DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons. RENCES: Kolman, B. Hill, D.R., Introductory Linear Algebral, Pears 2009. Kumaresan, S., Linear Algebra – A Geometric Approachl, Terrational (Strength Strength)	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOD on Education, First Reprint, Prentice – Hall of India,
UNI Linear I Wilson function REFEI 1) 2) 3)	T V DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons. RENCES: Kolman, B. Hill, D.R., Introductory Linear Algebral, Pears 2009. Kumaresan, S., Linear Algebra – A Geometric Approachl, Reprint, 2010.	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOD on Education, First Reprint, Prentice – Hall of India, n, Pearson Education, 2015.
UNI Linear 1 Wilsor function REFEI 1) 2) 3) 4)	T V DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons. RENCES: Kolman, B. Hill, D.R., Introductory Linear Algebral, Pears 2009. Kumaresan, S., Linear Algebra – A Geometric Approachl, Reprint, 2010. Lay, D.C., Linear Algebra and its Applicationsl, 5th Edition Niven, I., Zuckerman.H.S., and Montgomery, H.L., —An I	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOD on Education, First Reprint, Prentice – Hall of India, n, Pearson Education, 2015.
UNI Linear 1 Wilsor function REFEI 1) 2) 3) 4) 5)	T V DIOPHANTINE EQUATIONS AND CONGRUENC Diophantine equations – Congruence's – Linear Congruence's -C n's theorem – Fermat's little theorem – Euler's theorem – Euler's ons. RENCES: Kolman, B. Hill, D.R., Introductory Linear Algebral, Pears 2009. Kumaresan, S., Linear Algebra – A Geometric Approachl, Exprint, 2010. Lay, D.C., Linear Algebra and its Applicationsl, 5th Edition Niven, I., Zuckerman.H.S., and Montgomery, H.L., —An I Numbersl, John	hinese remainder theorem - Phi functions – Tau and Sigma TOTAL: 60 PERIOE on Education, First Reprint, Prentice – Hall of India, n, Pearson Education, 2015. ntroduction to Theory of

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19MMA06	Applied Mathematics for Electrical Engineers	LTPC
		4 0 0 4

(FOR M.E EST)

Preamble:

The goal of this course is to demonstrate various analytical skills in applied mathematics and extensive experience with the tactics of problem solving and logical thinking applicable for the students of electrical engineering. This course also will help the students to identify, formulate, abstract, and solve problems in electrical engineering using mathematical tools from a variety of mathematical areas, including matrix theory, calculus of variations, probability, linear programming and Fourier series.

Prerequisite: NIL

CO1	Apply various methods in matrix theory to solve system of linear Equations	Apply
CO2	Maximize and minimize the functional that occur in Electrical engineering discipline.	Evaluate
CO3	Understand discrete and continuous random variables and their applications electronic transmissions.	Understand
CO4	Apply suitable optimization techniques for solving linear programming models.	Apply
CO5	Analyze Fourier series and its applications in power spectrum.	Analyze

Course Outcomes: At the end of the course learners will be able to:

19MMA06	Applied Mathematics for Electrical Engineers		L T P C 4 0 0 4
	SYLLABUS		<u>+ 0 0 +</u>
UNIT I	MATRIX THEORY		12
•	omposition - Generalized Eigenvectors - Canonical basis - QR Factoriz d - Singular value decomposition.	zation	– Least
UNIT II	CALCULUS OF VARIATIONS		12
derivatives – I	riation and its properties – Euler's equation – Functional dependent on Functionals dependent on functions of several independent variables – oundaries – Isoperimetric problems - Direct methods : Ritz and Kanto	- Varia	ational problem
UNIT III	PROBABILITY AND RANDOM VARIABLES		12
Probability fur	Axioms of probability – Conditional probability – Baye's theorem action – Moments – Moment generating functions and their properties inform, Exponential, Gamma and Normal distributions – Function of a	s – Bir	nomial, Poissor
UNIT IV	LINEAR PROGRAMMING		12
Transportati	- Graphical solution – Simplex method – Big M method - T on and Assignment models.	wo p	hase method
UNIT V	FOURIER SERIES		12
function : Cos Exponential H	ometric series : Periodic function as power signals – Convergence of s ine and sine series – Non periodic function : Extension to other inter Fourier series – Parseval's theorem and power spectrum – Eigen actions – Regular Sturm - Liouville systems – Generalized Fourier series	vals – nvalue	Power signals
	T	OTAL	.: 60 PERIOD
REFERENCI	ES:		
	.C. and Phillips R.L., "Mathematical Techniques for Engineers and Sc all of India Pvt. Ltd., New Delhi, 2005.	eientis	ts",
2. Bronson, R	. "Matrix Operation", Schaum's outline series, 2 nd Edition, McGraw	Hill, 2	2011.
-	D. "Calculus of Variations", Dover Publications, New York, 2007.		
	A., Miller, I and Freund J., "Miller and Freund's Probability and Stati, Pearson Education, Asia, 8 th Edition, 2015.	stics f	for
5. O'Neil, P.V 2003.	"., "Advanced Engineering Mathematics", Thomson Asia Pvt. Ltd., Sir	ngapoi	re,
6. Taha, H.A. 2016.	, "Operations Research, An Introduction", 9 th Edition, Pearson educa	tion, 1	New Delhi,
Course Desig 1. Ms.K	gners: .Ruth Isabels ruthisabels@saveetha.ac.in		

rameshkumar@saveetha.ac.in





Department of Mathematics

Minutes of Board of studies meeting held on 26.02.19

The First **Board of studies meeting of Department of Mathematics** was conducted on **26.02.19** in Conference Hall, Saveetha Engineering College, Chennai.

The following Members attended:

Members from Saveetha Engineering college:

- Dr.R.Ramesh Principal
- Dr.R.Senthilkumar Vice Principal
- Prof.A.Gandhi Dean-III
- HODs & Autonomous Coordinators of all Departments
- All Faculty members of Department of Mathematics

Expert Members:

 1.Dr.K.Thirusangu Associate professor, Department of Mathematics. SIVET college, Chennai 2. Dr.R.S.Selvaraj Associate professor, Department of Mathematics, NIT - Warangal 	Two Experts from outside to be nominated by the Academic Council	
Dr. V. Sarada, Professor, CEG Campus, Anna University	One Expert nominated by the vice-chancellor	
Mr. Sivakumar Ganesan Sr. Associate - Projects Advanced Data Analytics, Cognizant	Industry Expert	
Mr.K.Lenin ME Cad Cam Alumnus (2016) Manager - Sony Traders	Alumnus nominated by the Principal	

Minutes of the BOS meeting

The meeting was chaired by our beloved Principal Dr.R.Ramesh.

- 1. Principal introduced the Board of studies members and gave a warm welcome to all Faculty members.
- 2. The Department head Ms.J.Joy Priscilla presented the proposed syllabus with unit wise contents for all subjects offered by Department of Mathematics to other Engineering Departments.
- 3. After the presentation, discussion session was there and the subject experts gave their suggestions.
- Dr.V. Saradha insisted that matrices unit should be included in the First semester for all the branches to create a comfort zone for the first year students in Mathematics.
 Dr.R.S.Selvaraj and Dr.K.Thirusangu also suggested the same.
- 5. **Dr.V. Saradha** suggested to include Functions of random variables, Transformation of random variables and Central limit theorem in the Probability subjects.
- 6. Madam also said to include Ergodic process, Random telegraph process and semi Random telegraph process in Random Process. Spectral densities and Linear time invariant system units also shall be included.
- 7. **Dr.R.S.Selvaraj** suggested to include basic foundation level topics in the first semester. Sir also suggested to include Functions of several variables before Integral Calculus unit.
- 8. Dr.R.S.Selvaraj told to alter the units in "Applied Calculus" as follows:

Unit I-Matrices; Unit II-Functions of several variables; Unit III- Multiple Integrals;

Unit-IV -Vector Calculus; Unit V- Ordinary differential equations.

9. Sir also insisted to remove Bessel's function from the syllabus of "Random process techniques" as it is not apt for syllabus title.

Dr.V. Saradha and Dr.K.Thirusangu also suggested the same.

- 10. **Dr.R.S.Selvaraj** suggested to include Complex variables and Contour integration for Electrical and Electronics Engineering as the students of that branch will need those concepts.
- 11. Sir also said to include ODE for CSE and IT branches if possible and pointed out that title of the subject **Series and Analysis** does not match with unit contents and suggested to rename as **Fourier series and complex variables.**
- 12. **Dr.R.S.Selvaraj** suggested to specify the units and topics with chapter numbers in Text Books for all the subjects as it will be easy for the Question paper setter.

- 13. **Dr.K.Thirusangu** insisted that Basic concepts to be taught in the first semester and told not to omit any fundamental topics in the syllabus.
- 14. Sir suggested to change the subject name of "TPDE for Mechanical Engineering" to "Transforms Techniques".
- 15. **Dr.K.Thirusangu** also suggested that Branch name need not be mentioned in subject name. Sir said to name the subjects relevant to the contents included.
- 16. **Mr. Sivakumar Ganesan** insisted to include the basic concepts of statistics for Information Technology branch as statistics plays a vital role in data analysis.
- 17. **Mr. Sivakumar Ganesan** also suggested to include statistics and probability concepts for Electrical and Electronics Engineering.
- 18. **Mr.K.Lenin** suggested that relevance of related subjects should be told to the students during the course.
- 19. **Mr.K.Lenin** also requested the Faculty members to mention the applications of the Mathematical concepts in the respective Engineering fields while teaching.
- 20. Finally Ms.J.Joy Priscilla thanked everyone for their valuable suggestions.

The meeting successfully ended with High Tea.





DEPARTMENT OF MATHEMATICS

2nd Board of Studies Meeting

24.12.2019

AGENDA

1) Revision of

- a. AGRI syllabus as per ICAR.
- b. 2 papers in CSE/IT departments
- c. 2 papers in EIE department
- 2) Inclusion of 3 Aptitude Papers
- 3) Suggestions BOS Members

(ONLY FOR AGRI as PER ICAR)

19MA203	COMPLEX VARIABLES AND DIFFERENTIAL EQUATIONS	L	T		C
		2	1	0	3
UNIT I	ORDINARY DIFFERENTIAL EQUATIONS		1	2	
Exact and Berno	oulli's differential equations – equations reducible to exact form by inte	grati	ng f	acto	rs-
equations of first	st order and higher degree-Clairaut's equation-Differential equations of	high	er o	rders	s-
	ng complementary functions and particular integrals-method of variation				
	chy and Legendre's linear equations-Simultaneous linear differential eq	uati	ons	with	
constant coeffic					
UNIT II	ANALYTIC FUNCTIONS		1		
	techniques - Bessel's and Legendre's differential equations- Functions			•	
	-continuity and analytic functions-Cauchy-Riemann equations-Harmoni	ic fu	nctio	ons.	
UNIT III	FOURIER SERIES		12		
	ns-Fourier series-Euler's formulae- Dirichlet's conditions-Functions ha				У
period -Fourier	series for function having period 2L - Even and odd functions - Half-ra	ange	seri	es-	
		-			
	d Cosine series - Harmonic analysis.	_			
UNIT IV	PARTIAL DIFFERENTIAL EQUATIONS	-	1		
UNIT IV Formation of pa	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and		itrar	у	
UNIT IV Formation of pa functions – Higl	PARTIAL DIFFERENTIAL EQUATIONS In trial differential equations using elimination of arbitrary constants and ther order linear partial differential equations with constant coefficients -		itrar	у	
UNIT IV Formation of pa functions – Higl non-linear partia	PARTIAL DIFFERENTIAL EQUATIONS Initial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method.		itrar lutio	y on of	
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE	– So	itrary lutio 12	y on of 2	
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UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional heat flow equations - Laplated edges)	– So iona place	itrary lutio 12 l hea e Ec	y on of 2 at flo quati	ow ior
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional wave solution of two dimensional heat flow equations - Laplated edges) TOTAL:	– So iona place	itrary lutio 12 l hea e Ec	y on of 2 at flo quati	ow ior
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS	PARTIAL DIFFERENTIAL EQUATIONS trial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplated edges) TOTAL:	– So iona place : 60	itrary lutio 12 l hea e Ec PEF	y on of 2 at flo quati	ow ior
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional wave solution of two dimensional heat flow equations - Laplated edges) TOTAL:	– So iona place : 60	itrary lutio 12 l hea e Ec PEF	y on of 2 at flo quati	ow ior
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UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES	PARTIAL DIFFERENTIAL EQUATIONS trial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensiady state solution of two dimensional heat flow equations - Laplated edges) TOTAL: CO04, "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi. S:	– So iona place : 60 43 rd	itrary lutio 11 hea e Ec	y on of 2 at flo quati	ow ior
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES 1.Bali N ,Goyal	PARTIAL DIFFERENTIAL EQUATIONS trial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensiady state solution of two dimensional heat flow equations - Laplated edges) TOTAL: Colspan="2">Colspan="2" Colspan="2" Colspan="2" Colsp	– So iona place : 60 43 rd	itrary lutio 11 hea e Ec	y on of 2 at flo quati	ow ior
UNIT IV Formation of pa functions – High non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES 1.Bali N ,Goyal imprint of Laks	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensiady state solution of two dimensional heat flow equations - Laplated edges) TOTAL: Colspan="2">S: 004, "Higher Engineering Mathematics", Tata McGraw Hill, New Delhi. S: Mand Watkins C, "Advanced Engineering Mathematics", Firewall Method Engineering Mathematics", Firewall Method Engineering Mathematics, Tata McGraw Hill, New Delhi.	- So iona place : 60 43 rd	itrar lutio 11 l hea e Ec PER	y n of 2 at fld quati	ow ion DS
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES 1.Bali N ,Goyal imprint of Laksl 2. Veerarajan T	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplated edges) TOTAL: One dimensional wave equation – One dimensional wave equations - Laplated edges) TOTAL: Colspan="2">Colspan="2" <td>- So iona place : 60 43rd</td> <th>itrar lutio 11 l hea e Ec PER</th> <th>y n of 2 at fld quati</th> <td>ow ior DS</td>	- So iona place : 60 43 rd	itrar lutio 11 l hea e Ec PER	y n of 2 at fld quati	ow ior DS
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES 1.Bali N ,Goyal imprint of Laks 2. Veerarajan T Education Pvt L	PARTIAL DIFFERENTIAL EQUATIONS trial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensiady state solution of two dimensional heat flow equations - Laplated edges) TOTAL: Colspan="2">Colspan="2" Colspan="2" </td <td>- So iona place : 60 43rd</td> <th>itrar lutio 11 l hea e Ec PER</th> <th>y n of 2 at fld quati</th> <td>ow ion DS</td>	- So iona place : 60 43 rd	itrar lutio 11 l hea e Ec PER	y n of 2 at fld quati	ow ion DS
UNIT IV Formation of pa functions – Higl non-linear partia UNIT V Classification o equations –Stea (excluding insul TEXT BOOKS 1.Grewal B.S 20 Edition,2014. 2.Ramana B.V2 REFERENCES 1.Bali N ,Goyal imprint of Laksl 2. Veerarajan T Education Pvt L 3. Narayan Shar	PARTIAL DIFFERENTIAL EQUATIONS artial differential equations using elimination of arbitrary constants and her order linear partial differential equations with constant coefficients - al differential equations – Charpit's method. APPLICATION OF PDE f PDE – Solutions on one dimensional wave equation – One dimensional wave equations - Laplated edges) TOTAL: One dimensional wave equation – One dimensional wave equations - Laplated edges) TOTAL: Colspan="2">Colspan="2" <td>- So iona place : 60 43rd</td> <th>itrary lutio 1 hea e Ec PEF</th> <th>y n of 2 2 at flo quati RIOI</th> <td>ow ion DS</td>	- So iona place : 60 43 rd	itrary lutio 1 hea e Ec PEF	y n of 2 2 at flo quati RIOI	ow ion DS

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1.	Ms. H.Mary Henrietta	maryhenrietta@saveetha.ac.in
2.	Ms. K.Ashwini	ashwini.k@saveetha.ac.in

ONLY FOR AGRI as PER ICAR)

19MA216	NUMERICAL ANALYSIS AND LAPLACE TRANSFORMATION	L T P C 2 1 0 3	
UNIT I	FINITE DIFFERENCE	12	
	e-various difference operators and their relationships-interpolation with equal ir ckward interpolation formula. Numerical differentiations using Newton's forwa		
UNIT II	INTERPOLATION AND NUMERICAL DIFFERENTIATION	12	
	irling's difference interpolation formulae-Interpolation with unequal intervals-N nula - Lagrange's interpolation formula.	lewton's divided	
UNIT III	NUMERICAL INTEGRATION AND SOLUTIONS OF ODE	12	
Numerical integ	grations of single integrals using Trapezoidal and Simpson's rules-Numerical so	lutions of ordinary	
differential equ	ations by Picard's and Taylor's series-Euler's and Modified Euler's methods-Ru	inge-Kutta method	
UNIT IV	LAPLACE TRANSFORMS	12	
Convolution th	itions-Transforms of elementary functions-basic properties-shifting theorems-In eorem-Transform of periodic functions-Application to solution of linear second ifferential equations		
UNIT V	TESTING OF HYPOTHESIS	12	
	cance-Degrees of freedom-Statistical errors-Large sample test(Z-test) – Small sed and Paired tests) – Testing of significance through variance (F-test)-Chi-squon, Regression		
	Т	OTAL: 60 PERIODS	
TEXT BOOK 1.Grewal B.S a	nd Grewal J.S., "Numerical Methods in Engineering and Science", Khanna Pub	lishers, 10 th Edition,	

New Delhi 2015.

2.NageswaraRaoG., Statistics for Agricultural Sciences, BS Publications.

REFERENCES :

1.Gerald C.F and Wheatley P.O., "Applied Numerical Analysis", Pearson Education, Asia 6th Edition, New Delhi 2006.

2.SankaraRao K "Numerical methods for Scientists and Engineers", Prentice Hall of India Private Ltd, 3rd Edition, New Delhi 2007.

3.Rangaswamy R., "A textbook of Agricultural Statistics", New Age Int. Publications Ltd. 4.Agarwal B.L., "Basic Statistics", Wiley Eastern Ltd, New Age International Ltd.

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2.	Ms. K.Ashwini	ashwini.k@saveetha.ac.in	

(FOR EEE & EIE)

19MA207	NUMERICAL METHODS AND PARTIAL DIFFERENTIAL EQUATIONS	L T P C 3 1 0 4		
UNIT I	VECTOR CALCULUS	12		
	ergence and curl – Directional derivative – Irrotational and solenoid	vector fields -		
Vector integr	ation -Gauss divergence theorem and Stoke's theorem (excluding pr	roofs) – Simple		
applications in	nvolving cubes and rectangular parallelopipeds.			
UNIT II	PARTIAL DIFFERENTIAL EQUATIONS	12		
	partial differential equations - Singular integrals - Solutions of standar			
	lifferential equations - Lagrange's linear equation - Linear partial diffe			
-	econd and higher order with constant coefficients of both homogeneou	us and non-		
homogeneous				
UNIT III	RANDOM VARIABLES AND DISTRIBUTIONS	12		
	continuous random variables - Moments - Moment generating functio	ns – Binomial,		
	netric, Exponential, Weibull Distributions.			
UNIT IV	CURVE FITTING AND SOLUTION OF SYSTEM OF	12		
~ ~ .	EQUATIONS			
Ų	- Method of least squares - Straight Lines - Quadratic and Parabol	A		
	on of algebraic and transcendental equations – Newton Raphson meth			
	of equations – Pivoting - Gauss elimination method – Gauss Jos	rdan method –		
	ods of Gauss Jacobi and Gauss Seidel.	10		
	UNIT V INTERPOLATION AND APPROXIMATION 12			
Interpolation with equal intervals – Newton's forward and backward difference formulae -				
	nterpolation - Interpolation with unequal intervals - Newton's divi	ided difference		
interpolation.	interpolation. TOTAL: 60 PERIODS			
TEXT BOO				
1) Veera	rajan. T., "Transforms and Partial Differential Equations", Second rep raw Hill Education Pvt. Ltd., New Delhi, 2012.	rint, Tata		
2) Kreys	szig Erwin, "Advanced Engineering Mathematics ", John Wiley and Soon, New Delhi, 2016.	ons, 10th		
3) Grew	 3) Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015. 			
REFERENC				
	.C., "Fundamentals of Applied Probability and Random Processes", E	lsevier, 1st		
,	n Reprint, 2007.	,		
· ·	Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.			
-	3) Chapra. S.C., and Canale.R.P., "Numerical Methods for Engineers, Tata McGraw Hill,5th			
, .	Edition, New Delhi, 2007S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.			
	untha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford Univer			
	2015.			
5) Weir,	M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India,	2016.		

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2.	Ms. V N Jayamani	jayamani@saveetha.ac.in

(FOR EEE & EIE)

19MA214	SERIES AND TRANSFORMS	L T PC 3 1 0 4
UNIT I	SEQUENCE AND SERIES	12
Tests of conv	efinition and examples – Series: Types and Convergence – Series of povergence: Comparison test, Integral test and D'Alembert's ratio test – A st – Series of positive and negative terms – Absolute and conditional con	lternating series
UNIT II	FOURIER SERIES AND TRANSFORMS	12
	n of Fourier series – Statement of Fourier integral theorem – Fourier trans ransforms of simple functions – Convolution theorem – Parseval's identity	
UNIT III	DISCRETE FOURIER TRANSFORMS	12
	er Transform - properties, magnitude and phase representation – computation romputation – computation – DIT & DIF using radix2 - FFT-Butterfly structure.	ation of DFT
UNIT IV	Z TRANSFORMS	12
	- Elementary properties – Inverse Z-transform using partial fractions and al value theorems - Convolution theorem.	residues –
UNIT V	WAVELET TRANSFORMS	12
wavelet transf		: 60 PERIODS
(An ii 2) The I Scien 2017 3) Algor	N., Goyal M. and Watkins C., —Advanced Engineering Mathematics, Fi mprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009 Illustrated Wavelet Transform Handbook: Introductory Theory and Applic ce, Engineering, Medicine and Finance, Second EditionHardcover – Imp by Paul S. Addison, CNC Press. ithms for Discrete Fourier Transform and Convolution - Tolimieri R, Spe cations.). cations in ort, 26 Jan
REFERENC		
	mes, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson ation, 2007.	1
	andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SH	
	Bali. and Manish Goyal, "A Textbook of Engineering Mathematics", 9th cations Pvt. Ltd, 2014.	Edition, Laxmi
	luction to Wavelets and Wavelet Transforms: A Primer 1st Edition - C. S or), Ramesh A. Gopinath (Author), Haitao Guo (Author)-Prentice Hall, 1	
,	ematics of the Discrete Fourier Transform: With Audio Applications by J (Author) – Create space publishers	ulius O., III

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1.	Ms. J. Joy Priscilla	joypriscilla@saveetha.ac.in
2.	Ms. V N Jayamani	jayamani@saveetha.ac.in

(FOR CSE & IT)

19MA206	LOGIC and COMBINATORICS	L T P C 3 1 0 4
UNIT I	SETS AND FUNCTIONS	12
Sets and operation	ations — Proofs of set identities — Relations — Equivalence relations –	Functions : one
to one, onto a	nd bijective functions, operations on functions : Inverse and composite F	unctions.
UNIT II	PROPOSITIONAL LOGIC	12
Propositional Methods-PC	logic – Arguments – Logical laws – Logical equivalences – Direct and In NF and PDNF (Using Truth tables and Laws).	ndirect
UNIT III	PREDICATE LOGIC	12
Theory of infe	rence – Quantifiers— Predicate formulas—Inference theory of predicate	es logic.
Proofs method	ls and strategy—Direct method of proofs and Indirect method of proofs.	0
UNIT IV	COMBINATORICS	12
pigeonhole pr recurrence rel	ciples — Permutations and combinations — Mathematical induction – T inciple — Inclusion and exclusion principle — Recurrence relations – So ations – Generating functions (Homogeneous Equations).	olving linear
UNIT V	GRAPHS AND TREES	12
Euler and Har	ties of trees-Distance and centre in tree-Rooted and binary trees-Spann	·
REFERENC 2. Trem Comp 3. J.L., N Secon REFERENC 1. Lipschut Pub. Co 2. Ralph. P Fourth E 3. Thomas 4. Seymour	h, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata M Co. Ltd., New Delhi, Special Indian Edition, 2011. Day, J.P. and Manohar.R, "Discrete Mathematical Structures with Applic Duter Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprin Mott, A. Kandel, T.P. Baker, "Discrete Maths for Computer Scientists & M d Edition, Prentice Hall of India Pvt Limited, New Delhi,2009.	eations to at, 2011. Mathematics". McGraw Hill action, 006.
Edition,2	D. Mohapatra Elements of Discrete Mathematics: A Computer Orien	

Sl.No.	Name of the Faculty	Email ID
1.	Mr. H.Prathab	prathab@saveetha.ac.in
2.	Dr.M.Rameshkumar	rameshkumar@saveetha.ac.in

(FOR CSE & IT)

19MA212

ALGEBRA AND NUMBER THEORY

L T P C 3 1 0 4

UNIT I	GROUPS	12
Groups : Def theorem.	inition - Properties - Homomorphism - Isomorphism - Cyclic groups - Cosets - La	grange's
UNIT II	RINGS, FIELDS AND POLYNOMIALS	12
	tion - Sub rings - Integral domain - Field - Integer modulo n - Ring homomorphism tible polynomials over finite fields - Factorization of polynomials over finite fields	
UNIT III	DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS	12
	brithm – Base - b representations –Prime and composite numbers lidean algorithm – Fundamental theorem of arithmetic – LCM.	
UNIT IV	DIOPHANTINE EQUATIONS AND CONGRUENCES	12
-	nantine equations – Congruence's – Linear Congruence's - Applications: Divisionentiation-Chinese remainder theorem – $2 \ge 2$ linear systems.	sibility tests -
UNIT V	CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS	12
Wilson's the functions.	orem – Fermat's little theorem – Euler's theorem – Euler's Phi functions – Tau and	l Sigma
	ΤΟΤΑ	L: 60 PERIOD
Educ 2. Kosl	naldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", Pearson eation, 5th Edition, New Delhi, 2007. ny, T., —Elementary Number Theory with Applications, Elsevier Publications, Ne	w Delhi, 2002.
Publica 2. Lidl, 3. Nive Numb 4. Andr	ES : Ling and Chaoping Xing, —Coding Theory – A first Course, Cambridge ations, Cambridge, 2004 R. and Pitz, G, "Applied Abstract Algebra", 2 nd Edition Springer Verlag, New De n, I., Zuckerman.H.S., and Montgomery, H.L., —An Introduction to Theory of ers, John Wiley and Sons, Singapore, 2004. rews, G. E, "Number theory", Dover publications, Newyork, 2012. tein, I. N, "Topics in Algebra", 2 nd Edition, John Wiley and Sons, India.	lhi, 2006.

Course Coordinators

Sl.No.	Name of the Faculty	Email ID
1.	Mr. H.Prathabprathab@saveetha.ac.in	
2.	Dr.M.Rameshkumar	rameshkumar@saveetha.ac.in

APTITUDE PAPERS

	System of Numerical and Logical Terminologies	L	Т	Р	С
19EY703	(Common to all Branches)	0	0	2	1

PREAMBLE

This course is designed to assess candidates in terms of their skills, knowledge, ability and personality. **Aptitude tests are** accurate way of predicting the potential contribution of a candidate and the likelihood of them achieving success within the organization. It can improve decision making, logical thinking, time management and IQ. The use of aptitude and knowledge tests to screen potential job applicants has long been standard practice across many different sectors.

PREREQUISITE

Basic mathematical concepts

COURSE OUTCOMES

At the end of the course learners will be able to							
CO1	Understand the underlying properties of numbers that we use in day to day life	Understand					
CO2	Understand the variety of ways that simple mathematical tools can be used for.	Understand					
CO3	Can apply the short cuts of the mathematical tools to reduce the time durationin problem solving	Apply					
CO4	Can think logically to apply the reasoning methods and evaluate complex relationships between the variables	Evaluate					
CO5	Break down the given problem into discrete parts and analyse the ways in which it can be solved	Analysis					
CO6	Create his own method of arriving at a solution for a given problem	Create					

MAPPING OF COs WITH POs AND PSOs

		1- Low			2 – moderate			3 - significant				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	2	-	-	-	-	-	-	-	-

Syllabus

Unit 1: Number Concepts

Classification of Real number system: Integers / Fractions, Rational / Irrational –Number properties: Even/ Odd property, Prime/Composite, Co-prime, Divisibility test, Remainder theorem -Factors – HCF / LCM –Unit's digit problems – Factorial problems –Surds and indices –Vedic Maths. Reasoning ability: Ranking sequence.

Unit 2: Percentages

Concept of Percentages, Percentage Increase/Decrease, Continuous increase and decrease-Profit and Loss: Fundamental concepts, Mark up and down sales, Traders sales deal - SI and CI:Fundamental concepts, relational concepts, quarterly and half yearly calculations Reasoning ability: Coding and Decoding

Unit 3: Ratios and proportions

Ratios: Rules and concepts, proportions, value based problems - Averages: Weighted Average, Continued and discontinued Sums - Mixtures and alligations: Mixture of 2 elements, Mixture of more than 2 elements, Replacement problems – Partnerships: Time dependent, Time independent

Reasoning ability: Direction sense

Unit 4: Algebra

Expressions: Terms, Powers, types, Degrees - Identities: Squares, Cubes and Power of N -Linear equations: Single variable, Multi variable – Quadratic equations: Finding roots, types of roots - Word problems: Framing equations from statements. Reasoning ability: Blood relations

Unit 5: Practical math topics

Problems on ages -Clocks: angle between hands, forming straight lines and right angles, Gaining and losing time – Calendars: Finding the day, Same calendar – Logarithms – Progressions: Arithmetic and geometric progression, Sequence and series.

Reasoning ability:Non-verbal: Mirror image, Water image, Paper cutting and Paper folding – Number series and Alphabet series.

TEXT BOOKS:

1. "Quantitative Aptitude for Competitive Examinations" by R.S. Aggarwal - 2017

- 2. "Teach Yourself Quantitative Aptitude" by Arun Sharma 2017
- 3. "A modern approach verbal and non -verbal reasoning" by R.S. Aggarwal 2017

REFERENCE BOOKS

1. "Shortcuts in Mathematics" by AkhileshKhare – 2016

- 2. "Vedic maths for competitive exams" by Ravi Shankar 2016
- 2. "Quantitative Aptitude for Competitive Examination" by AbhijitGuha 2017

6 Hours

6 Hours

6 Hours

6 Hours

Total: 30 Hours

6 Hours

	Advanced quantitative and logical reasoning (Common to all Branches)					
19EY704		0	0	2	1	

PREAMBLE

This course is designed to assess candidates in terms of their skills, knowledge, ability and personality. **Aptitude tests are** accurate way of predicting the potential contribution of a candidate and the likelihood of them achieving success within the organization. It can improve decision making, logical thinking, time management and IQ. The use of aptitude and knowledge tests to screen potential job applicants has long been standard practice across many different sectors.

PREREQUISITE

Fundamental mathematics, Basic Quantitative and Logical reasoning concepts

COURSE OUTCOMES

At the end of the course learners will be able to							
CO1	Understand the topics which predominantly appear in the quantitative and logical reasoningAssessments.	Understand					
CO2	Decode the problem type and apply the related method to find the solution	Apply					
CO3	Apply simple logical thinking to solve the problems related to reasoning	Apply					
CO4	Interpret the data provided in different format related to the question asked	Analysis					

MAPPING OF COs WITH POs AND PSOs

		1-	Low		2	- moder	ate	3	- signifi			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	1	-	-	-	-	-	-	-	-	-
CO4	-	2	-	1	-	-	-	-	-	-	-	-

Syllabus

UNIT - I TIME AND WORK

Introduction, Chain Rule, Unitary Method, Efficiency and Ratios, work and wages, joining and leaving, Alternate days, **Pipes and Cisterns:** Inlet pipes and Outlet pipes **Reasoning ability:**Syllogism, Statement and conclusions

UNIT – 2 TIME AND DISTANCE

Concepts, Uniform speed, Average speed, Relative speed, Ratio concept, Races, Circular Tracks –**Problems on Trains:** same direction and opposite direction - **Boats and Streams:** downstream speed and Upstream speed.

Reasoning ability:seating arrangement - linear, circular, square, rectangle, input-output

Unit 3: COUNTING METHODS

Principles of counting, Factorial notation - **Permutation:**Linear, Circular, with and without repetition –**Combination**: Exactly model, Either or model, At least model and At most model – **Set Theory**: Standard sets, Venn diagrams, Union and intersection – **Probability:** Introduction, Sample space, Types of Events, Count based problems and Probability based problems **Reasoning ability:** Analogy - Flowcharts

Unit 4: GEOMETRY

Two Dimensional:lines and angles, perimeter and areas - **3 Dimensional**: volumes and surface areas, Trigonometry: Trigonometric ratios, heights and distances – **Coordinate geometry**: Line Equations, Slopes, Perpendicular and parallel lines- Functions **Reasoning ability:**Cubes and Dice – Inequalities

Unit 5: DATA INTERPRETATION AND PUZZLES

Data interpretation: Introduction, Data tables, Bar graphs, line graphs, pie charts, mixed charts, Statistical measures – Data sufficiency.

Reasoning ability: – Mathematical operations, Logical puzzles.

TEXT BOOKS:

1. Quantitative Aptitude for Competitive Examinations by R.S. Aggarwal - 2017

2. Teach Yourself Quantitative Aptitude by Arun Sharma – 2017

3. A modern approach verbal and non -verbal reasoning by R.S. Aggarwal - 2017

REFERENCE BOOKS

1. A Complete Book of Data Interpretation & Analysis by ADDA - 2019

2. Quantitative Aptitude for Competitive Examination by AbhijitGuha – 2017

3. Solved Placement Papers Campus Recruitment by Praxis groups - 2017

6 Hours

6 Hours

6 Hours

6 Hours

6 Hours

Total: 30 Hours

1052705	COMPANY SPECIFIC ASSESMENTS FOR EMPLOYABILITY (Common to all Branches)	L	т	Ρ	С
19EY706	(Common to all Branches)	0	0	2	1

PREAMBLE

To crack the company assessments for employability during campus interviews, a student should be proficient in quantitative aptitude, logical reasoning and verbal ability. This course is designed with an objective of equipping students with question patterns and strategies to successfully ace the aptitude tests. It helps students to understand the different types of questions asked by different companies and acts as a thorough test-prep module.

PREREQUISITE

Intermediate knowledge of quantitative aptitude, logical reasoning and verbal ability.

COURSE OUTCOMES

At the end of the course learners will be able to							
CO1	Understand the concepts required to write the test.	Understand					
CO2	Apply quantitative aptitude and logical reasoning skills in the company specific tests.	Apply					
CO3	Apply verbal ability skills in the company specific tests.	Apply					
CO4	Understand and apply the problem solving techniques	Apply					
CO5	Apply time management and short-cut methods to solve problems in the company specific aptitude tests	Apply					
CO6	Ascertain specific areas for self-improvement by evaluation of scores in multiple mock tests.	Evaluate					

MAPPING OF COs WITH POs AND PSOs

		1- Lo	ow			2 – m	odera	te		3 - sigr	nifican	t				
COURSE	PROGRAM OUTCOMES													PROGRAM SPECIFIC OUTCOMES		
OUTCOME S	РО	РО	РО	РО	РО	РО	РО	РО	PO	РО	РО	PO	PSO	PSO	PSO	
3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	
CO2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	
CO4	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	
CO6	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	

SYLLABUS

UNIT 1 – COMPANY SPECIFIC TIER 1TEST PATTERN

6

Tier 1 Company Assessment patterns for employability (Quantitative techniques and logical ability Section) – Sample sets of Tier 1 Company questions – Cognitive learning technique introduction

UNIT 2– COMPANY SPECIFIC TIER 2 TEST PATTERN

6

Tier 2 Company Assessment patterns for employability (Quantitative techniques and logical ability Section) – Sample sets of Tier 2 Company questions – Cognitive learning technique

UNIT 3 -VERBAL ABILITY

6

Application of Verbal Ability concepts in Question Types such as Sentence Errors, Sentence Correction and Sentence Completion –High Frequency words – Spellings – Idioms – Phrasal Verbs -Application of strategies in Analogies – Synonyms – Antonyms – Order of Words – Odd Word Out, Reading Comprehension passages – keyword search strategies

UNIT 4-COMPANY SPECIFIC TIER 1 VERBAL ABILITY PATTERN

6

Tier 1 Company Assessment patterns for employability (Verbal section)-Company specific mock tests for Verbal Ability section

UNIT 5 – COMPANY SPECIFIC TIER 2 VERBAL ABILITY PATTERN

6

Tier 2 Company Assessment patterns for employability (Verbal section) - Company specific mock tests for Verbal Ability section

TOTAL: 30Hours

TEXT BOOKS

- 1. Quantitative Aptitude for Competitive Examinations by R.S.Aggarwal
- 2. A Modern Approach to Verbal & Non-Verbal Reasoning by R.S. Aggarwal
- 3. A Modern Approach to Logical Reasoning by R.S. Aggarwal

REFERENCE BOOKS

- 1. "Shortcuts in Mathematics" by AkhileshKhare 2016
- 2. "Vedic maths for competitive exams" by Ravi Shankar 2016
- 3. "Quantitative Aptitude for Competitive Examination" by AbhijitGuha– 2017

4. How to Prepare For Verbal Ability and Reading Comprehensionby Arun Sharma,

- MeenakshiUpadhyay
- 8th edition





Department of Mathematics

Minutes of Board of studies meeting held on 24.12.19

The Second **Board of studies meeting of Department of Mathematics** was conducted on **24.12.19** in Seminar Hall, Saveetha Engineering College, Chennai.

The following Members attended:

Members from Saveetha Engineering college:

- Dr.R.Ramesh Principal
- Dr.R.Senthilkumar Vice Principal
- Prof.A.Gandhi Dean-III
- HODs & Autonomous Coordinators of all Departments
- All Faculty members of Department of Mathematics

Expert Members:

 1.Dr.K.Thirusangu Associate professor, Department of Mathematics. SIVET college, Chennai 2. Dr.R.S.Selvaraj Associate professor, Department of Mathematics, NIT - Warangal	Two Experts from outside to be nominated by the Academic Council	
Dr. V. Sarada, Professor, CEG Campus, Anna University	One Expert nominated by the vice-chancellor	
Mr. Sivakumar Ganesan Sr. Associate - Projects Advanced Data Analytics, Cognizant	Industry Expert	
Mr.K.Lenin ME Cad Cam Alumnus (2016) Manager - Sony Traders	Alumnus nominated by the Principal	

Minutes of the BOS meeting

The meeting was chaired by our beloved Principal Dr.R.Ramesh.

- 1. Principal introduced the Board of studies members and gave a warm welcome to all Faculty members.
- 2. The Department head Ms.J.Joy Priscilla presented the proposed syllabus with unit wise contents for all subjects offered by Department of Mathematics to other Engineering Departments.
- 3. After the presentation, discussion session was there and the subject experts gave their suggestions.
- Dr.V. Saradha insisted that matrices unit should be included in the First semester for all the branches to create a comfort zone for the first year students in Mathematics.
 Dr.R.S.Selvaraj and Dr.K.Thirusangu also suggested the same.
- 5. **Dr.V. Saradha** suggested to include Functions of random variables, Transformation of random variables and Central limit theorem in the Probability subjects.
- 6. Madam also said to include Ergodic process, Random telegraph process and semi Random telegraph process in Random Process. Spectral densities and Linear time invariant system units also shall be included.
- 7. **Dr.R.S.Selvaraj** suggested to include basic foundation level topics in the first semester. Sir also suggested to include Functions of several variables before Integral Calculus unit.
- 8. Dr.R.S.Selvaraj told to alter the units in "Applied Calculus" as follows:

Unit I-Matrices; Unit II-Functions of several variables; Unit III- Multiple Integrals;

Unit-IV -Vector Calculus; Unit V- Ordinary differential equations.

9. Sir also insisted to remove Bessel's function from the syllabus of "Random process techniques" as it is not apt for syllabus title.

Dr.V. Saradha and Dr.K.Thirusangu also suggested the same.

- 10. **Dr.R.S.Selvaraj** suggested to include Complex variables and Contour integration for Electrical and Electronics Engineering as the students of that branch will need those concepts.
- 11. Sir also said to include ODE for CSE and IT branches if possible and pointed out that title of the subject **Series and Analysis** does not match with unit contents and suggested to rename as **Fourier series and complex variables.**
- 12. **Dr.R.S.Selvaraj** suggested to specify the units and topics with chapter numbers in Text Books for all the subjects as it will be easy for the Question paper setter.

- 13. **Dr.K.Thirusangu** insisted that Basic concepts to be taught in the first semester and told not to omit any fundamental topics in the syllabus.
- 14. Sir suggested to change the subject name of "TPDE for Mechanical Engineering" to "Transforms Techniques".
- 15. **Dr.K.Thirusangu** also suggested that Branch name need not be mentioned in subject name. Sir said to name the subjects relevant to the contents included.
- 16. **Mr. Sivakumar Ganesan** insisted to include the basic concepts of statistics for Information Technology branch as statistics plays a vital role in data analysis.
- 17. **Mr. Sivakumar Ganesan** also suggested to include statistics and probability concepts for Electrical and Electronics Engineering.
- 18. **Mr.K.Lenin** suggested that relevance of related subjects should be told to the students during the course.
- 19. **Mr.K.Lenin** also requested the Faculty members to mention the applications of the Mathematical concepts in the respective Engineering fields while teaching.
- 20. Finally Ms.J.Joy Priscilla thanked everyone for their valuable suggestions.

The meeting successfully ended with High Tea.