KONERU LAKSMAIAH EDUCATION FOUNDATION (KLEF)
DEPARTMENT OF MATHEMATICS
PROGRAM DEVELOPMENT DOCUMENT
M.Sc. (Computational Mathematics)
Y23-Batch (2023-24)

VISION OF UNIVERSITY:

To be a globally renowned university.

MISSION OF UNIVERSITY:

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.

VISION OF THE DEPARTMENT:

Department of Mathematics strives to be internationally recognised for academic excellence.

MISSION OF THE DEPARTMENT:

To provide an environment where the students can learn and become competent users of Mathematics and Mathematical application also to emerge as a global center of learning, academic excellence and innovative research.

MISSION STATEMENTS :

M1. To create an ambience of Mathematical thinking and applying the same to solve complex engineering problems.

M2. To Develop Mathematical model to solve problems at global level.

M3. To collaborate with other campus entities, individuals, professional associations and local community organizations.

GOALS OF THE UNIVERSITY:

1. To offer academic flexibility by means of Choice based credit systems and the like.

2. To identify and introduce new specializations and offer programs in emerging areas therein.

3. To incorporate into the curriculum the Application orientation and use high standards of competence for academic delivery

4. To design and implement educational system adhering to outcome based International models.

5. To introduce and implement innovamtion in teaching and learning process to strengthen academic delivery.

6. To offer academic programs at UG, PG, Doctoral, Post-Doctoral which are industry focused, and incorporates Trans-discipline, inter-discipline aspects of the education system.

7. To deliver higher education that includes technologies and meeting the global requirements.

PROGRAME EDUCATIONAL OBJECTIVES:

The Program Educational Objectives (PEOs) are as follows:

PEO-1: Apply mathematics and technology tools (MATLAB) to solve problems.

PEO-2: Understand the use of mathematical tools and concepts in other fields.

PEO-3: Communicate, and work, with people of diverse backgrounds in individual and group settings, in an ethical and professional manner.

PEO-4: Critically analyze information and concepts to adapt to advances in knowledge and technology in the workplace.

PROGRAMME OUT COMES (PO) :

Programme Outcomes

PO1 : To identify, formulate, abstract and analyze complex, real life or engineering problems using the principles of mathematical techniques.

PO2 : To apply the mathematical concepts in the fields of high end research and recognize their need and prepare for lifelong learning.

PO3 : To apply mathematics tools (MATLAB, R, and MINITAB) for a better decision making in complex situations.

PO4 : To maintain the core of mathematical and technical knowledge which is adaptable for solid foundation for lifelong learning.

PO5 : To apply ethical principles of mathematical techniques for the commitment of professional ethics, responsibilities and socio-economic needs of the society.

PO6 : Ability to do interdisciplinary research among allied subjects related to applied mathematics.

P07 : Use symbolic and numerical software as part of practical computation.

Mapping of GOALS with MISSION:

Academic Goals	Mission Statements			
	M1	M2	M3	
G1			√	
G2			√	
G3	√			
G4			√	
G5		√		
G6		√	√	
G7			√	

Mapping of PEOs with GOALS :

PEOs	Academic Goals						
	G1	G2	G3	G4	G5	G6	G7
PEO1				√	√		√
PEO2		√				√	√
PEO3				√	√		
PEO4	√	√	√			√	

Thrust areas of M.Sc.(Computational Mathematics)			
LOCAL (*APIIC*)	**REGIONAL** (*APIIC &Industry Policy-Telangana*)	**NATIONAL** (*CII, NSDC*)	**GLOBAL** (*World Economic Forum*)
Teaching Profession	Teaching Profession	Teaching Profession	Teaching Profession
I.T.Industry	I.T.Industry	I.T.Industry	I.T.Industry
		Industrial_Data Analyst	**Industrial_Data Analyst**
https://apindustries.gov.in/incentives/Data/APIndustrial_Policy_Brochure.pdf	http://industries.telangana.gov.in/Library/Industries%20Policy%20Book%202015.pdf	**https://www.cii.in/PublicationDetail.aspx?enc=EybQ0l0ZfuOvvjXhsIi6HufXCGQ0P2eeL5OV8RB+1l0rIhqmDemCge6V5b1Dlacjo8566Ln57lacL9TgMOjIUmOZOi6Jr5TNtAoon0xFCfmwhuaMecXQQOIrqpZyDMP2FnxdXCR3LPk+qb+GfgfX9vgAnD6+W8FSrQ2lSgF545XgyQTMwEP/zp5UQKwidAVU**	**https://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf**
https://www.rgukt.in/pdfdoc/GO142019HigherEducationDeptGovtofAP.pdf	https://www.aicte-india.org/downloads/reg-paydiploma_220110.pdf	https://www.aicte-india.org/downloads/reg-paydiploma_220110.pdf	https://www.aicte-india.org/downloads/reg-paydiploma_220110.pdf

Mapping of needs with Mission:

Local, Regional, National and Global Needs		Mission Statements			
		M 1	**M 2**	**M 3**	
Local Needs	Teaching Profession	√	√		
	I.T.Industry	√	√		
Regional Needs	Teaching Profession	√	√		
	I.T.Industry	√	√		
National Needs	Teaching Profession	√	√	√	
	I.T.Industry	√	√	√	
	Industrial Data Analyst	√	√	√	
Global Needs	Teaching Profession	√	√	√	
	I.T.Industry	√	√	√	
	Industrial Data Analyst	√	√	√	

Courses to be Introduced in 2023-24 Curriculum as per Local, Regional, National and Global Needs:

Local, Regional, National and Global Needs		Courses to be introduced in 2023-24 curriculum as per identified needs
Local Needs	Teaching Profession	23CM1101-Linear Algebra 23CM1104-Numerical Methods
	I.T.Industry	23UC1101- Communication Skills 23CM1105- Problem Solving using C 23CM1203- Probability and Statistics using R 23CM1204- Matrix Computation using Python
Regional Needs	Teaching Profession	23CM1102-DBMS 23CM1103-Discrete Mathematics
	I.T.Industry	23CM1201- Essential of Research Design 23CM1202- Data Structures and Algorithms 23CM2101- Operations Research 23CM2102-Mathematical Methods
National Needs	Teaching Profession	23CM2103- Stochastic Processes
	I.T.Industry	23CM2104-- Soft Computing 23CM2105- Deep Learning
	Industrial Data Analyst	23CM2106- Cyber Security 23CM2107- Big Data Analytics 23CM2108- Cognitive Engineering 23CM2109- Ethical Hacking
Global Needs	Teaching Profession	23CM2103- Stochastic Processes
	I.T.Industry	23CM2104-- Soft Computing 23CM2105- Deep Learning
	Industrial Data Analyst	23CM2106- Cyber Security 23CM2107- Big Data Analytics 23CM2108- Cognitive Engineering 23CM2109- Ethical Hacking

MAPPING OF PEOs with MISSION OF THE DEPARTMENT:

S.No	Description of PEOs	Key Components of Mission		
		M 1	**M 2**	**M 3**
		To create an ambience of Mathematical thinking and applying the same to solve complex engineering problems.	To Develop Mathematical model to solve problems at global level	To collaborate with other campus entities, individuals, professional associations and local community organizations.
PEO 1	Apply mathematics and technology tools (MATLAB) to solve problems.	.✓.		.
PEO 2	Understand the use of mathematical tools and concepts in other fields.			✓
PEO 3	Communicate, and work, with people of diverse backgrounds in individual and group settings, in an ethical and professional manner.			✓
PEO 4	Critically analyze information and concepts to adapt to advances in knowledge and technology in the workplace	✓	✓	

MAPPING OF POs/PSOs with PEOs:

S No.	Key Components of POs and PSOs	Description of PEO			
		Apply mathematics and technology tools (MATLAB) to solve problems.	Understand the use of mathematical tools and concepts in other fields.	Communicate, and work, with people of diverse backgrounds in individual and group settings, in an ethical and professional manner.	Critically analyze information and concepts to adapt to advances in knowledge and technology in the workplace
		PEO 1	PEO 2	PEO 3	PEO 4
PO1	To identify, formulate, abstract and analyze complex, real life or engineering problems using	✓	✓		✓
PO2	To apply the mathematical concepts in the fields of high end research and recognize their need and prepare for life long learning	✓	✓	✓	✓
PO3	To apply mathematics tools (MATLAB, R, and MINITAB) for a better decision making in	✓	✓		✓
PO4	To maintain the core of mathematical and technical knowledge which is adaptable for solid	✓	✓		✓

PO5	To apply ethical principles of mathematical techniques for the commitment of professional ethics,		✓	✓	
PO6	Ability to do interdisciplinary research among allied subjects related to applied		✓		✓
PO7	Use symbolic and numerical software as part of practical computation.	✓			✓

D. Program Articulation Matrix

S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO 1	2	3	4	5	6	7	8	PSO 1	2	3	4
1	23UC1101	Communication Skills	Core	0	0	4	0	2					5							
2	23CM1101	Linear Algebra	Core	3	1	0	0	4		2										
3	23CM1102	DBMS	Core	3	0	2	0	4		2	3		5	6	7					
4	23CM1103	Discrete Mathematics	Core	3	1	0	0	4	1						8		2	2	2	8
5	23CM1104	Numerical Methods	Core	3	0	2	0	4	1	2	3						2	1	2	2
6	23CM1105	Problem Solving using C	Core	3	0	2	4	5				4			7		1			

S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO 1	2	3	4	5	6	7	8	1	2	3	4
7	23CM1201	Essential of Research Design	Core	0	0	4	0	2	1	2	3	4								
8	23CM1202	Data Structures and Algorithms	Core	3	0	2	0	4	1	2		4								
9	23CM1203	Probability and Statistics using R	Core	3	0	2	4	5	1	2	3									
10	23CM1204	Matrix Computation using Python	Core	3	0	2	4	5	1	2	3									

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S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO											
									1	2	3	4	5	6	7	8	1	2	3	4
11	23CM2101	Operations Research	Core	3	0	0	0	3	1											
12	23CM2102	Mathematical Methods	Core	3	1	0	0	4	1	2	3		5							
13	23CM2103	Stochastic Processes	Core	3	1	0	0	4			3	4								
14	23CM2101	Operations Research	Core	3	0	2	0	4	1											

S.No	Course Code	Course Name		L	T	P	S	Credits	O											
									1	2	3	4	5	6	7	8	1	2	3	4
23	23CM2201	MOOCS	Core	3	0	2	0	4												
24	23CM2202	Major Project	Core	3	0	2	0	4	1		3	4		6					3	

Elective-I

S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO								P			
									1	2	3	4	5	6	7	8	1	2	3	4
1	23CM1205	Data Science	Core	4	0	0	0	4			3									
2	23CM1206	Machine Learning	Core	4	0	0	0	4		2										

| 3 | 23CM1207 | Quantum Computing | Core | 4 | 0 | 0 | 0 | 4 | | | | | | 6 | | | | | | |

Elective –II

S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO								PSO			
									1	2	3	4	5	6	7	8	1	2	3	4
1	23CM2104	Soft Computing	Core	4	0	0	0	4	1											
2	23CM2105	Deep Learning	Core	4	0	0	0	4			3									
3	23CM2106	Cyber Security	Core	4	0	0	0	4					5							

Elective –III

S.No	Course Code	Course Name	Category	L	T	P	S	Credits	PO 1	2	3	4	5	6	7	8	PSO 1	2	3	4
1	23CM2107	Big Data Analytics	Core	4	0	0	0	4	1	2										
2	23CM2108	Cognitive Engineering	Core	4	0	0	0	4	1			4								
3	23CM2109	Ethical Hacking	Core	4	0	0	0	4	1						7					

DEPARTMENT OF MATHEMATICS

2020-2021 M.Sc.(App.Mathematics) BATCH Course Outcomes vs Program Outcomes

Course Articulation Matrix

S No	Course Code	Course Title	LTPS	Credits	CO NO	Description of the Course Outcome	Program Outcomes								Course Rationale
							1	2	3	4	5	6	7	8	
1	21AM1101	**Real Analysis**	*4-0-0-0*	*4*	CO1	Describe the fundamental properties of the real numbers that lead to the formal development of real analysis.		2							For the students to develop a strong foundation in Real Analysis and the theory of integration
					CO2	Demonstrate an perceptive of limits and how they are used in sequences, series, differentiation and integration		2			5	6	7		
					CO3	Describe and apply the important properties of the limit and continuity and the differentiation and integration of the sequences and series of functions. Explain the basic properties of the Riemann integration		2			5	6	7		

#	Code	Course	L-T-P-O	Credits	CO	Course Outcome										Description
					CO4	Determine the Riemann integrability of a bounded or unbounded function and prove a selection of theorems concerning integrations.	2				5	6	7			
2	21AM1102	**ORDINARY DIFFERENTIAL EQUATIONS**	*3-0-2-0*	*4*	CO1	Apply the existence and uniqueness conditions of solution of the homogeneous/non-homogeneous differential equation and the system of differential equations.		2	3							This course intends to highlight basic concepts, principles and procedure of ODE as a tool to analyze practical problems and as such it lays down foundation for the understanding of basic science and Engineering problems. Our emphasis is on principles rather than routine calculations and our approach is a compromise between diversity and depth. The students acquire the knowledge on usage of ODE with MATLAB.
					CO2	Apply the power series method of solution to second order ODE arising in mathematical physics- Gauss hypergeometric , Hermit and Chebyshev polynomials.	1	2								
					CO3	Apply Green's function method to study behavior of the Boundary Value Problems (BVP) for second order ODE.		2								
					CO4	Determine the oscillatory solutions of BVP and illustrate their qualitative properties.		2								

#	Code	Course	L-T-P-S	Credits	CO	Description									
					CO5	Verify the solution of the ODE through MATLAB.									
3	21AM1103	Discrete Mathematics	*3-1-0-0*	*4*	CO1	Apply the rules of Propositional logic to establish valid results and apply rules of valid inference and hence understand how to construct correct mathematical arguments, Mathematical Induction		3		6	7		<mark>***********(course rational)</mark>
					CO2	Understand the concept of relations, functions and discrete structures , Count discrete event occurrences , lattices, to represent the Boolean functions by an expression Formulate and solve recurrence relations of homogeneous and non homogeneous relations, understand some recursive algorithms.	2	3		6	7		
					CO3	Formulate and solve recurrence relations of homogeneous and non	2	3		6	7		

S.No	Course Code	Course Name	L-T-P-S	Credits	CO	Course Outcome	PO Mapping										Course Rationale
						homogeneous relations, understand some recursive algorithms.											
					CO4	Use graph theory for various techniques to study and analyze different problems associated with computer design, logic design, Formal languages, Artificial Intelligence etc, Analysis of different traversal methods for trees and graphs.		2	3		5	6	7				
4	21AM1104	**Introduction to Computer Programming**	*3-0-2-0*	*4*	CO1	Introduction to basic computer organization and computer fundamentals. Introduction to Programming language fundamentals. Illustrate and use Control Flow Statements in C++.	1										
					CO2	Introduction to functions in C++ and Decomposition of programs through function.	1										*********(course rationale)
					CO3	Interpret & Illustrate user defined C++ functions and different operations on list of data.	1										
					CO4	Illustrate Object Oriented Concepts and implement linear data structures	1										
					CO5	Develop the code for the algorithms in C++	8										
5	21AM1105	**MATHEMATICAL STATISTICS**	*3-1-0-0*	*4*	CO1	Explain the concepts of random variable, probability distribution, distribution			3								To apply statistics to real time problems

						function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables											
					CO2	Explain the concepts of independence, jointly distributed random variables and conditional distributions, and use generating functions to establish the distribution of linear combinations of independent random variables.	2										
					CO3	..Explain the concepts of random sampling, statistical inference and sampling distribution, and state and use basic sampling distributions.State the central limit theorem, and apply it.	1										
					CO4	Construct the sampling distribution of mean and variance and calculation of mean and variance of sampling distribution of mean and variance..		3									
6	21AM1106	*Seminar-1*	*0-0-2-0*	*1*													

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S.No	Code	Course	L-T-P-S	Credits	CO	Description									Rational
7		**Communication and Logical Skills**	*0-0-4-0*	*4*	CO1	Relating grammar concepts and receptive skills for documenting and editing	2								
					CO2	Able to set goals through SWOT and present themselves effectively during the Interview.			2						
					CO3	Apply and formulate the concepts of mathematical principles besides logic and basic mathematical formulae to solve word based situational problems.			2						
					CO4	Estimate inductive reasoning, to categorize the rules-set from a given list of observations and relate them to predict the conclusions according to the given conditions	2								
8	21AM1201	Abstract Algebra	*3-0-0-0*	*4*	CO1	Define group, subgroup and quotient group with examples, and proving some preliminary lemmas			3						==*********(course rational)==
					CO2	Define homomorphism and automorphisim of groups .Explain Cayley's and Sylow's theorems of finite groups and demonstrate the problems	1								
					CO3	Define a ring, homomorphismof rings, ideal, quotient rings with examples. Explain principal ideal domain, unique factorization domain, modules over PID theorems and demonstrate the problems.			2						

					CO												
					CO4	Define field and Polynomial ring with examples. Explain the field of Quotients of an integral domain and Euclidean and polynomial rings with problems	4										
9	21AM1202	*Data Structures*	*3-0-2-0*	*4*	CO1	Analyze and compare stack ADT and queue ADT implementations using linked list andapplications	1			4							
					CO2	Analyze the linked lists and types of Binary trees and their representations	1			4							
					CO3	Apply measures of efficiency on algorithms and Analyze different Sorting Algorithms, Analyze the linked implementation of Binary,Balanced Trees and different Hashing techniques	1		2						**********		
					CO4	Analyze different representations, traversals, applications of Graphs and Heap organization			2	4							
					C05	Develop and Evaluate common practical applications for linear and non-linear data structures	1	2									
10	21AM1203	*Statistical Inference*	*3-1-0-0*	*4*	CO1	Obtain estimates of parameters and identify the various methods to estimateit.	1										
					CO2	Apply various principles for the data reduction and draw conclusion about the population based upon samples drawn from it	,	2							*********		
					CO3	Describe the tests of significance and draw conclusion about the population and sample using various tests			3								

#	Code	Course	L-T-P	Cr	CO	Outcome											
					CO4	.Testing the hypothesis to analyze the variance and also predict the linear relationship between the two variables			3								
11	21AM1204	*Numerical Analysis*	*3-0-2-0*	*4*	CO1	Apply analytical and numerical methods to solve algebraic and transcendental equations		2	3								**********
					CO2	Apply interpolating polynomials for interpolation and extrapolation	1	2									
					CO3	Apply Numerical differentiation and integration techniques	,	2									
					CO4	Apply numerical methods to solve Ordinary Differential Equations		2									
					CO5	Compute the numerical solutions through MATLAB	1										
12	21AM1205	Complex Analysis	*3-1-0-0*	*4*	CO1	Explain the definition of continuity, differentiability, apply the concepts of analytic function and harmonic function to explain Cauchy-Riemann equations; Understganding Power Series.											*********
					CO2	Apply the concept of conformal mapping, and describe the mapping properties of Möbius transformations and how to apply them for conformal											

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							mappings in Fluid Dynamics,etc.	
						CO3	Explain complex contour integrals; Understand simple sequences and series apply the convergence properties of a power series, and to determine the Taylor series or the Laurent series of an analytic function	
						CO4	Explain properties of singularities and poles of analytic functions and apply to compute residues integrals by applying residue techniques.	

						CO1		
13	21 AM 120 6	Technical Skills	0-0-0-4	1		CO2		
						CO3		
						CO4	.	

		Seminar -2				CO1		
14	21AM1 207		*0-0-2-0*	*1*		CO2		
						CO3		

					CO4		

No	Code	Course	L-T-P-C	Credit	CO	Description	
15	20UC1102	Design Thinking and Innovation - 1	1-0-0-4	2	CO1		
					CO2		
					CO3		
					CO4		

| 16 | 21AM2101 | **Topology** | 3-0-0-0 | 3 | CO1 | Explain the definition of Finite, countable, uncountable sets and **apply** the concepts of composite function and Axiom of choice to explain Zorn's Lemma. | 1 |
| | | | | | CO2 | Explain the concept of open sets, closed sets and basis for a topology describe the properties of product space and **apply** the concept of topological space and | 1 |

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						continuous function.								
					CO3	Explain the definition of compact space and connected space and **apply** the concept of finite intersection property and Bolzano weier strass property.	1							
					CO4	Explain the properties of Hausdorff's space and normal space and **apply** the Urysohn's lemma to determine the urysohn'smetrization theorem, Tietze extension theorem, and tychonoff theorem.	1							

S.No	Code	Name	L-T-P	Cr	CO	Description								
17	21AM2102	Partial Differential Equations	3-1-0-0	4	CO1	Model the relevant phenomena as a Partial differential equations and obtain the solutions		2						************
					CO2	Understand the Nature of the higher order Partial differential equation and obtain the solutions			3						
					CO3	Express the Laplace equation in Various coordinate systems and solve by Fourier series method	1				5				
					CO4	Solve the Hyperbolic and Parabolic differential equations by Separation of variable method	1				5				

| 18 | 21AM2103 | | 3-1-0-0 | 4 | CO1 | Apply the basic concepts of generalized co-ordinates, Physical Properties of Fluids:Concept of fluids, Continuum | | | 3 | | | | | | ********* |

		Continuum Mechanics				Hypothesis, Kinematics of Fluids:Eulerian and Lagranges methods of Description of Fluids, Equvalence of Lagrangian and Eulerian Methods						
					CO2	Deformation of Fluid Elements, Analytical Approach to Deformation, Stress - strain relations, Steady and unsteady flows, Stream Lines, Path Lines and Streak Lines		3				
					CO3	Stress in Fluids and Constitutive Equations:Stress tensor, Normal Stresses, Shear Stresses, Symmetry of Shear of Stress tensor, newtonian Fluids, Non Newtonian Fluids, Purely viscous fluids, Reiner Rivlin Fluids, Power Law Fluids, Visco elastic fluids Viscous Fluid Flows: Flow between two parallel plates, Plane ciutte flow, Plane poiseuille flow, Flow over an inclined plane,			4			
					CO4	Flow of two immissible fluids, Flow through circular pipe. Flow through an annulus, Flow between two porous plates,Planecouette flow, Flow through convergent and divergent channels, Stagnent point, Unsteady flows. Unsteady flow over a flat plate, Unsteady flow between two parallel plates			4			

19	21AM2104	**Statistics with R Programming**	*3-0-2-0*	*4*	CO1	Understand the basic functions in R programming and identify the operators using in it.						8

						CO2	Simulating data using R				8
						CO3	Apply various probability distributions to the real world problems using R		3		
						CO4	Analyze the data using various linear and nonlinear lines using R		3		

20	21AM2105	Seminar-3	0-0-2-0	1						

21		Elective-1	3-1-0-0	4					

| 22 | 20UC1203 | Design Thinking and Innovation - 2 | *1-0-0-4* | *2* | | | | | | | | |
| 23 | 21AM2201 | Fluid Dynamics | *3-0-2-0* | *4* | | | | | | | | |

						Apply Laplace transform techniques to solve linear differential equations in system analysis where initial conditions can be easily included to give system response.	1		3	4					
24	21 A M 22 02	Transfor m Techniqu es	3-0-2-0	4	CO1										
					CO2	Applying z- transform and Mellin transform to the analysis and characterization of Discrete Time systems.	1		3						
					CO3	Apply Fourier series to analyze various signals				4					
					CO4	Apply Fourier transforms to analyze various signals.						6			
					CO5	Verify the solution of the Transform techniques through MATLAB									

25	21AM2203			24						

		Dissertation with Research Publication	*0-0-24-0*							

26		Elective-II	*3-1-0-0*	*4*						

27		Elective-III	*3-1-0-0*	*4*						

ELECTIVE-I

1	21AM 2106	Operations Research	*3* *3-1-0-0*	*4*	CO1	Apply the concept of Linear Programming to formulate and find the optimal solution of linear programming problems			3									
					CO2	Apply other methods to solve Linear Programming Problem and study the sensitivity of the solution			3									
					CO3	Apply different methods to solve Transportation and Assignment problems			3									
					CO4	Apply different methods to solve integer programming and game problems.		3	3									

2	21AM21 07	Functional Analysis	*3-1-0-0*	*4*														

3	21AM21 08	Fuzzy mathematics and applications	*3-1-0-0*	*4*												

ELECTIVE-II

1.	1	21AM22 04	Mathematical Modelling	*3-1-0-0*	*4*	CO1	Model and solve real life problems through difference equations and describe mathematical models using proportionality and geometric similarity.	1								

					CO2	Determine best fitting models	1						
					CO3	Interpret real life problems using simulation modeling.	1							
					CO4	Apply mathematical modelling through differential equations	1							

2	21AM2205	Mathematical Control Theory	3-1-0-0	4	CO1									
					CO2									
					CO3									
					CO4									

| 3 | 21AM2206 | Dynamical Systems | 3-1-0-0 | 4 | | | | | | | | | | | | |

ELECTIVE III

1	21AM2207	Advanced Numerical Analysis	3-0-2-0	4	CO1	Find of Eigen Values of a Matrix by using poer and Jacobi methods.	1							
					CO2	Solve initial value problems		2						
					CO3	Classify and solve PDE.	1							
					CO4	Apply Galerkins, Rayleigh-Ritz methods and their compatibility.	1							

2	21AM2208	Number Theory	3-1-0-0	4													

3	21AM2209	Applied Stochastic Processes	3-1-0-0	4														