M.Sc. (Mathematics)

Academic Year	Name of the Course	Course Code	Name of the Programme	Course outcomes/ Activities with direct bearing on Employability/ Entrepreneurship/Skill development
2021-2022	Algebra	M1CP1	M.Sc. (Mathematics)	By studying this course, students will be exposed to the concepts of normal series, solvable groups, nilpotent groups, group action on a set sylow theorems. Students will get the knowledge of irreducible polynomials, PID, UFD, ED.
2021-2022	Real Analysis	M1CP2	M.Sc. (Mathematics)	By studying this course, the student will be exposed to various concepts of real analysis and its applications.
2021-2022	Ordinary Differential Equations	M1CP3	M.Sc. (Mathematics)	After completion of this course, students will get the knowledge on solving of differential equations in series methods. They will get the techniques to find eigen values, eigen vectors of BVP and extreme values of various functionals.
2021-2022	Discrete Mathematics	M1CP4	M.Sc. (Mathematics)	After studying this course, the students will understand the concept of basic, and Boolean algebra. The various applications to modelling and computer science can be learnt.
2021-2022	Fundamentals of Statistics	M1CP5	M.Sc. (Mathematics)	After studying this course, basics of statistics will be learnt and probability theory, theoretical probability discrete and continuous distributions will be learnt. Applications of random experiments can be understood.
2021-2022	Seminar	M1CP6	M.Sc. (Mathematics)	Seminar presentation will develops the analytical knowledge and skills on the subject. Also student will build self confident for facing on interviews.
2021-2022	Mathematical Analysis	M2CP2	M.Sc. (Mathematics)	By studying this course the student will be exposed to the knowledge and applications of Fourier series. The student can discriminate between the study of functions of a single variable and two variable concepts.
2021-2022	Topology	M2CP3	M.Sc. (Mathematics)	After studying of this course, students will get theoretical concepts with applications on topological spaces, compact spaces, separation and connected spaces.

2021-2022	Complex Analysis	M2CP4	M.Sc. (Mathematics)	The student will be able to understand the concepts and development of complex number system. The applications of contour integration, zeros and singularities are well understood by the student at the end of the course.
2021-2022	Special Functions	M2CP5	M.Sc. (Mathematics)	By studying this course, student will get the knowledge of Lgendre polynomials, Bessels function, Hermite polynomials and Laguerre polynomials and the applications of the said polynomials.
2021-2022	Seminar	M2CP6	M.Sc. (Mathematics)	Seminar presentation will develops the analytical knowledge and skills on the subject. Also student will build self confident for facing on interviews.
2021-2022	Measure and Integration	M3CP1	M.Sc. (Mathematics)	This course will gives theoretical knowledge with applications on Measurable sets, Lebesgue integrals of different types measurable functions and functions of Bounded variation.
2021-2022	Functional Analysis	M3CP2	M.Sc. (Mathematics)	After studying this course the student will be exposed to the knowledge of linear spaces, metric spaces, and inner product space to linear will be well understand.
2021-2022	Partial Differential Equations	M3CP3	M.Sc. (Mathematics)	The student will be able to understand the various applications of partial differential equations in other branches of science like physics, Engineering and allied science.
2021-2022	Mathematical Programming	M30P4(1)	M.Sc. (Mathematics)	After studying this course, students will get the knowledge of formulation of LLP with real time applications. By getting the knowledge of transportation and assignment problems, students will be able to solve the real time problems.
2021-2022	Numerical Analysis	M30P4(2)	M.Sc. (Mathematics)	After study of this course, students will get an idea on solving IVP, linear systems, non-linear systems and BVP with different techniques.
2021-2022	Automata and Languages	M30P4(3)	M.Sc. (Mathematics)	Gaining knowledge and understanding the properties of languages, grammar with formal mathematical methods.
2021-2022	Advanced Complex Analysis	M30P4(4)	M.Sc. (Mathematics)	At the end of this course the student will be motivated towards the research in complex analysis.
2021-2022	Commutative Rings and Modules	M30P4(5)	M.Sc. (Mathematics)	After this course, students will get a knowledge on different types of modules and Ideals.

2021-2022	Mechanics of Solids	M30P4(6)	M.Sc. (Mathematics)	After doing this course, students would realize the physical quantities tensors, which are more than one direction, understand strains and stresses, and how the relations between them (constitutive relations) involve elastic constants which in turn give strength of materials.
2021-2022	Computer Fundamentals and Programming in C	M30P5(1)	M.Sc. (Mathematics)	This course is designed to provide knowledge on computer and C language. The students will be able to develop logics which will help them to create programs and applications through C.
2021-2022	Office Automation and C Language	M30P5(2)	M.Sc. (Mathematics)	This course is designed to provide knowledge on office Automation with MS- Word, MS-Excel and C language. The student will be able to develop logic, which will help them to create programs and applications through C.
2021-2022	Numerical Analysis using C	M30P5(3)	M.Sc. (Mathematics)	After completion of the course, the students will be able to solve the problems using Numerical Techniques and with the learning the logics using C language, we will be writing.
2021-2022	Seminar	M3CP4	M.Sc. (Mathematics)	Seminar presentation will develops the analytical knowledge and skills on the subject. Also student will build self confident for facing on interviews.
2021-2022	Advanced Linear Algebra	M4CP1	M.Sc. (Mathematics)	At the end of this course students will get theoretical and computational knowledge on different types of linear transformations, with matrix of a linear transformation and vice-versa. Also this course helps to get a fundamental concepts on companion matrices, rational forms and bilinear forms.
2021-2022	Graph Theory	M4CP2	M.Sc. (Mathematics)	At the end of this course the student will understand the applications of Graph theory to various other branches of science in particular to Statistics, Computer Science, Operation Research etc.
2021-2022	Integral Equations and Transforms	M4CP3	M.Sc. (Mathematics)	This course is designed the learnt transformations and solving of integral equations.
2021-2022	Near Rings	M40P4(1)	M.Sc. (Mathematics)	This course gives fundamental concepts on different types near rings, modules, sub-modules, Ranks and minimal and maximal conditions.

2021-2022	Theory of Ordinary Differential Equations	M40P4(2)	M.Sc. (Mathematics)	After completion of this course, students will get the knowledge on solving of linear systems and behavior of their solutions. Also this course gives stability of Linear, Quasi-linear, Autonomous and Non- Autonomous systems.
2021-2022	Operations Research	M40P4(3)	M.Sc. (Mathematics)	After studying this course, students will be motivated to do, research in queuing theory and nonlinear programming and they will get the knowledge of the construction of a network diagram, solving the problems by using network diagrams and dynamic programming.
2021-2022	Computational Methods for Partial Differential Equations	M40P4(4)	M.Sc. (Mathematics)	At the end of this course the student will gain the knowledge of Numerical techniques in solving partial differential equations and applications of these in solving Boundary value problems.
2021-2022	Automata and Machines	M40P4(5)	M.Sc. (Mathematics)	After completion of the course, the student will be able to understand and has the knowledge on how the machines will compute functions and solve the problems.
2021-2022	Theory of Reliability	M40P4(6)	M.Sc. (Mathematics)	This course is designed to learn fundamentals and more applications on Reliability.
2021-2022	Programming Methodology	M40P5(1)	M.Sc. (Mathematics)	This course is designed to provide the knowledge to analyze a problem and to design algorithms, implement and evaluate a computing solution.
2021-2022	Programming in C++	M40P5(2)	M.Sc. (Mathematics)	The student will be able to understand how C++ improves C with object oriented features. It is also helps to learn how to use functions for efficiency and performance.

KAKATIYA UNIVERSITY
M.A/M.Sc (MATHEMATICS)
Semester I/II/III/IV
Scheme of Instruction and Examination
(With effect from 2019-2020 batch)

SEMESTER-I

Paper	Code of The paper	Title of The paper	No. of Periods (1 hr duration) per week	Internal Assess-ment Marks	Semester End Exam Marks			Credits (L+P)
					Theory	Practical	Total	
I	M1CP1	Algebra	6	20	80	-	100	6
II	M1CP2	Real Analysis	6	20	80	-	100	6
III	M1CP3	Ordinary Differential Equations	6	20	80	-	100	6
IV	M1CP4	Discrete Mathematics	6	20	80	-	100	6
V	M1CP5	Fundamentals of Statistics	6	20	80	-	100	6
		Seminar	2				25	1
					Total Credits			31

SEMESTER-II

Paper	Code of The paper	Title of The paper	No. of Periods (1 hr duration) per week	Internal Assess-ment Marks	Semester End Exam Marks			Credits (L+P)
					Theory	Practical	Total	
I	M2CP1	Field Extensions and Galois Theory	6	20	80	-	100	6
II	M2CP2	Mathematical Analysis	6	20	80	-	100	6
III	M2CP3	Topology	6	20	80	-	100	6
IV	M2CP4	Complex Analysis	6	20	80	-	100	6
V	M2CP5	Special Functions	6	20	80	-	100	6
		Seminar	2				25	1
					Total Credits			31

SEMESTER-III

Paper	Code of The paper	Title of The paper	No. of Periods (1 hr duration) per week	Internal Assess-ment Marks	Semester End Exam Marks			Credits (L+P)
					Theory	Practical	Total	
I	M3CP1	Measure and Integration	6	20	80	-	100	6
II	M3CP2	Functional Analysis	6	20	80	-	100	6
III	M3CP3	Partial Differential Equations	6	20	80	-	100	6
IV	M3OP4(1)	Mathematical Programming	6	20	80	-	100	6
	M3OP4(2)	Numerical Analysis	6	20	80	-	100	6
	M3OP4(3)	Automata and Languages	6	20	80	-	100	6
	M3OP4(4)	Advanced Complex Analysis	6	20	80	-	100	6
	M3OP4(5)	Commutative Rings and Modules	6	20	80	-	100	6
	M3OP4(6)	Mechanics of Solids	6	20	80	-	100	6
V	M3OP5(1)	Computer fundamentals and Programming in C	7(4+3)	20	60	20	100	4(L) + 2(P)
	M3OP5(2)	Office automation and C Language	7(4+3)	20	60	20	100	4(L) + 2(P)
	M3OP5(3)	Numerical Analysis using C	7(4+3)	20	60	20	100	4(L) + 2(P)
		Seminar	2				25	1
					Total Credits			31

SEMESTER-IV

Paper	Code of The paper	Title of The paper	No. of Periods (1 hr duration) per week	Internal Assess-ment Marks	Semester End Exam Marks			Credits (L+P)
					Theory	Practical	Total	
I	M4CP1	Advanced Linear Algebra	6	20	80	-	100	6
II	M4CP2	Graph Theory	6	20	80	-	100	6
III	M4CP3	Integral Equations and Transforms	6	20	80	-	100	6
IV	M4OP4(1)	Near Rings	6	20	80	-	100	6
	M4OP4(2)	Theory of Ordinary Differential Equations						
	M4OP4(3)	Operations Research	6	20	80	-	100	6
	M4OP4(4)	Computational Methods for Partial Differential Equations	6	20	80	-	100	6
	M4OP4(5)	Automata and Machines	6	20	80	-	100	6
	M4OP4(6)	Theory of Reliability	6	20	80	-	100	6
V	M4OP5(1)	Programming Methodology	7(4+3)	20	60	20	100	4(L) + 2(P)
	M4OP5(2)	Programming in C++						
	M4OP5(3)	Applied Stochastic Process with MATLAB	7(4+3)	20	60	20	100	4(L) + 2(P)
		Seminar	2				25	1
					Total Credits			31

L →Lecture, P→ Practical, M→ Mathematics, CP→ Core Paper, OP→ Optional Paper

Summary

Semester	No. of Credits	Marks
I	31	525
II	31	525
III	31	525
IV	31	525
Total	**124**	**2100**

The Scheme of 1st Internal Assessment of each paper of Semester-I to IV is as follows:

KAKATIYA UNIVERSITY
M.A./M.Sc (Mathematics) (w.e.f 2019-20)
1st Internal Assessment Examination
Semester-I/II/III/IV
Papers I/ II/ III/ IV/ V

Time: 1 ½ Hours Max Marks: 15.

Answer Any five of the following questions.
All questions carry equal marks.

1. A question from unit-I
2. A question from unit-I
3. A question from unit-I
4. A question from unit-I
5. A question from unit-II
6. A question from unit-II
7. A question from unit-II
8. A question from unit-II

Note: Five Marks will be awarded from assignments given to the students

The Scheme of 2nd Internal Assessment of each paper of Semester-I to IV is as follows:

KAKATIYA UNIVERSITY
M.A./M.Sc (Mathematics) (w.e.f 2019-20)
2nd Internal Assessment Examination
Semester-I/II/III/IV
Papers I/ II/ III/ IV/ V

Time: 1 ½ Hours Max Marks: 15.

Answer Any five of the following questions.
All questions carry equal marks.

1. A question from unit-III
2. A question from unit-III
3. A question from unit-III
4. A question from unit-III
5. A question from unit-IV
6. A question from unit-IV
7. A question from unit-IV
8. A question from unit-IV

Note: Five Marks will be awarded from assignments given to the students

The scheme of the examination of each paper of Semester I to IV is as follows.

KAKATIYA UNIVERSITY
M.A./M.Sc (Mathematics)
(w.e.f 2019-20)
Semester-I/II/III/IV
Papers I/ II/ III/ IV/ V

Time: 3 Hours Max Marks: 80/60*

*for papers having practical examination

Answer all Questions.
All Questions carry equal Marks.

1. a) A short question From Unit-I.
   b) A short question From Unit-II.
   c) A short question From Unit-III.
   d) A short question From Unit-IV.

2. Answer any two of the following.
   a) From Unit-I.
   b) From Unit-I.
   c) From Unit-I.
   d) From Unit-I.

3. Answer any two of the following.
   a) From Unit-II.
   b) From Unit-II.
   c) From Unit-II.
   d) From Unit-II.

4. Answer any two of the following.
   a) From Unit-III.
   b) From Unit-III.
   c) From Unit-III.
   d) From Unit-III.

4. Answer any two of the following.
   a)From Unit-IV.
   b) From Unit-IV.
   c) From Unit-IV.
   d) From Unit-IV.

KAKATIYA UNIVERSITY
M.A/M.SC. MATHEMATICS Syllabus(w.e.f. 2019-20)
Semester - I
Paper – I
Paper Code: M1CP1
ALGEBRA

UNIT I

Isomorphism theorems on Groups - Normal Series - Solvable groups - Nilpotent groups
(Chapter 5 : Sec 2 and Chapter 6 of Text Book 1)

UNIT II

Group Action on A set : The notation of a group action on a set - Isotropy subgroups - Orbits - Application of G-sets to counting.
Sylow Theorems: P-groups - Cauchy theorem - the Sylow theorems - Application of the Sylow theorems - Application to P-groups and the class equation - Further applications.
(Sec 16,17,36,37 of Text Book 2)

UNIT III

The field of quotients of an integral domain: The construction - Uniqueness.
Rings of Polynomials: Polynomials in an indeterminate – A review – The evaluation homomorphism - Factorization of polynomials over a field - The Division algorithm in F[x] - Irreducible Polynomials - Eisenstein criterion - Uniqueness of factorization in F[x] - Prime fields - Application to unique factorization in F[x].
(Sec 21,22,23,27.17 to 27.27 of Text Book 2)

UNIT IV

Factorization: Unique factorization domains. Every PID is a UFD. If D is a UFD then D[x] is a UFD.
Euclidean Domains: Euclidean domains and Arithmetic in Euclidean domains.
Gaussian Integers and Multiplicative norms.
(Sect 45,46,47 of Text Book 2)

Text Book:

1. Basic Abstract Algebra by P.B. Bhattacharya, S.K.Jain, and S.R.Nagpaul, Second Edition , Cambridge University press.
2. A first Course in Abstract Algebra by John B.Fraleigh, Seventh Edition, Pearson education.

Reference Books:

1. Abstract Algebra by David S.Dummit, Richard M.Foote, Second edition, Wiley Student edition
2. Topics in Algebra by I.N Herstein
3. University algebra by N.Gopala Krishna.
4. Abstract Algebra by S.Lang.

KAKATIYA UNIVERSITY
M.A/M.SC. MATHEMATICS Syllabus(w.e.f 2019-20)
Semester - I
Paper – II
Paper Code: M1CP2
REAL ANALYSIS

UNIT I

Metric Spaces: Limit points – Closed sets – Open sets – Perfect Sets – Bounded Sets – Closure of a set - Compact sets – Connected sets.

Numerical sequences in metric spaces: Subsequences – Cauchy sequence – Dia-meter of a set – Definition of complete metric space.

Continuous functions in metric spaces: Characterization of continuity in terms of open sets and closed sets, Continuity and Compactness.

(Sec 2.15, 2.16, 2.18 - 2.38, 2.44 – 2.47, 3.1, 3.2, 3.5, 3.6(a), 3.7 – 3.11(a), (b), 3.12, 4.5 – 4.8, 4.13, 4.14, 4.18, 4.19, 4.22 of Text Book)

UNIT II

The Riemann-Stieltjes Integral: Definitions of partition – Refinement of partition and RS-Integral, Necessary and Sufficient condition for integrability, Integral as a limit of a sum.

Integrability of continuous, Monotonic, discontinuous and composite functions.

Properties of the Integral: Integrability of sum and product of two functions – Integrability of modulus of a function – Integrators as step functions – Conversion of RS – Integral to Riemann integral.

(Sec 6.1 – 6.17, 6.19 of Text Book)

UNIT III

Sequences and Series of Functions: Pointwise and Uniform Convergence - Cauchy criterion for uniform convergence – Weirstrass M_n – test – Uniform convergence and Continuity – Uniform convergence and Integrability –Uniform convergence and differentiability - Equi continuous families of functions

(Sec 7.1 – 7.14, 7.16 – 7.25 of Text-book)

UNIT IV

Weirstrass approximation theorem – Definition of uniformly closed algebra – Stone's generalization of the Weirstrass theorem.

Power Series: Radius of Convergence – Real Power Series – Continuity and Differentiability of Power Series – Abel's theorem – inversion in the order of summation - Taylor's theorem – Identical power series.

(Sec 3.38 – 3.40, 7.26 – 7.32, 8.1 – 8.5 of Text-book)

Text Book:

Principles of Mathematical Analysis by Walter Rudin, McGraw – Hill, 3rd Edition

Reference books :

1. Mathematical Analysis by S.C.Malik and Savita Arora, S.Chand, 4th Edition
2. Mathematial Analysis by T.Apostle, Narosa.

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester – I
Paper – III
Paper Code: M1CP3
ORDINARY DIFFERENTIAL EQUATIONS

UNIT I

Integration in series : Ordinary and singular points – power series solution at ordinary point-Frobenius method – Problems on type I , type II , type III and type IV – series solution about regular singular point at infinity.
(Chapter 8: Sec 8.1 to 8.14 of Text Book 1)

UNIT II

Linear equations with variable coefficients: Introduction – Initial value problem for homogeneous equation – The Wronskian and linear dependence – reduction of the order of homogeneous equation – The non homogeneous equation.
(Sec 3.1 to 3.6 of Text Book 2)

UNIT III

Existence and uniqueness of solution of first order equation: The method of successive approximation – The Liptsctitz condition – Sturm-Liouville problem – Orthogonality of eigen functions and Reality of eigen functions.
(Sec 5.4 to 5.5 of Text Book 2 and Sec 15.10 to 15.12 of Text Book 1)

UNIT IV

Variational problems with fixed boundaries: Euler's equation for functional containing first order derivative and one independent variable – Extremals – Functional dependent on higher order derivatives – Functions dependent on more than one independent variable – Variational problem in parametric form – Invariance of Euler's equation under coordinate transformation.
(Chapter 1 of part V of Text Book 1)

Text book

1. Advanced differential equations, M.D. Raisingania,S.Chand Company Ltd.
2. An introduction to ordinary differential equations by E.A. Coddington Prentice-Hall of India Pvt. Lted.

Referene books :

1. Differential equations with applications and Historical notes by George F. Simmons
2. Theory of ordinary differential equations by Somasundaram – Narosa.

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f. 2019-20)
Semester - I
Paper – IV
Paper code: M1CP4
DISCRETE MATHEMATICS

UNIT I: Fundamentals of Logic

Fundamentals of logic-Logical inferences - Methods of proof of an implication – First order logic and other methods of proof - Rules of inference for propositions - Rules of inference for quantified propositions.

(Sec 1.5, 1.6, 1.7, 1.8 up to De Morgan Laws, 1.9 of Text Book)

UNIT II: Permutations and Combinations

Enumerating combinations and permutations with repetitions- Enumerating permutations with constrained repetitions- The principle of inclusion and exclusion.

(Sec 2.1 to 2.5, 2.8 of Text Book)

UNIT III: Recurrence Relations

Generating function of sequences – Calculating coefficients of generating functions- Recurrence relations- Solving recurrence relations by substitution and generating functions- the method of characteristic roots – solutions of inhomogeneous recurrence relations.

(Sec 3.1 to 3.6 of Text Book)

UNIT IV: Boolean Algebra

Introduction, Boolean algebras – Boolean polynomials – Disjunctive and Conjunctive normal forms – Switching functions.-minimijation of switching functions.

(Sec 6.1 to 6.5 of Text Book)

Text Book:

Discrete Mathematics for Computer Scientists and Mathematicians by J.L.Mott, A. Kandel, and T.P. Baker

Reference Books:

1. Discrete Mathematical structures by Roden.
2. Discrete Mathematics by Kolman.
3. A Text book of Discrete Mathematics by Tremblay and Manohar.
4. Elements of Discrete Mathematics by C.L.Liu, McGraw Hill Company

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester - I
Paper – V
Paper Code: M1CP5
FUNDAMENTALS OF STATISTICS

UNIT I

Moments–Pearson's β and γ coefficients -Skewness and Kurtosis
Probability Definitions–Addition Theorem-Conditional probability - Multiplication Law of probability - Baye's Theorem - Random Variables - Probability mass function – Probability density function.
(Chapter 2, 3, 4.2, 5.1 to 5.5.5 of Text Book)

UNIT II

Mathematical Expectation – Expectation of a function of a random variable – Addition and Multiplication theorem of expectation - Expectation of linear Combination of random variables – Covariance – Variance of linear combination on of random variables – Moment generating function – Chebychev's inequality – Correlation –Karl Pearson's coefficient of Correlation- Linear regression.Angle between two regression lines.
(Chapter 6.1 to 6.6.1, 7.1, 7.1.2, 7.5,10.1 to 10.4.2, 11.1 to 11.2.3 of Text Book)

UNIT III

Discrete Distributions - Bernoulli distribution – Moments of Bernoulli distribution – Binomial distribution – Moments - Moment generating function of Binomial distribution – Additive property of Binomial distribution - Poisson distribution – Moments of Poisson distribution – Geometric distribution –Lack of memory property.
(Chapter 8.1 to 8.4.1, 8.4.4 to 8.4.7, 8.5, 8.5.2, 8.5.3, 8.5.5, 8.5.8, 8.7 to 8.7.3 of Text Book)

UNIT IV

Continuous Distributions -Normal Distribution – Characteristics of Normal Distribution and normal probability curve - Moments of Normal Distribution – Area property- Gamma Distribution - Moment generating function of Gamma Distribution – Exponential distribution- Moment generating function of Exponential distribution- Lack of memory property.
(Chapter 9.1, 9.2, 9.2.2 to 9.2.5, 9.2.7 to 9.2.11, 9.5, 9.5.1, 9.5.3, 9.8, 9.8.1 of Text Book)

Text Book:

Fundamentals of Mathematical Statistics by S.C. Gupta & V.K.Kapoor, 11th Edition

K KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester - II
Paper – I
Paper Code: M2CP

Field Extensions and Galois Theory

UNIT I

Algebraic Extensions of Fields: Adjunction of roots - Algebraic extensions - Algebraically closed fields.
(Chapter 15: Sect 2, 3, 4 of the Text Book)

UNIT II

Normal and Separable extensions: Splitting fields - Normal extensions - Multiple roots - Finite fields - Separable extensions.
(Chapter 16 of the Text Book)

UNIT III

Galois Theory : Automorphism groups and fixed fields - Fundamental theorem of Galois theory - Fundamental theorem of algebra.
(Chapter 17 of the Text Book)

UNIT IV

Applications of Galois theory to classical problems: Roots of unity and Cyclotomic polynomials - Cyclic extensions - Polynomials solvable by radicals.
(Chapter 18: Sec 1, 2, 3 of the Text Book)

Text-Book

Basic abstract algebra by P.B. Bhattacharya, S.K.Jain and S.R. Nagpaul, 2nd Edition, Cambridge University press

Reference Books:

1. A first course in abstract algebra by J.B. Fraleigh.
2. Algebra by S. Lang
3. Topics in algebra by T.N. Herstein
4. University algebra by Gopala Krishna.
5. Abstract Algebra by David S. Dummit, Richard M. Foote, Second edition, Wiley Student edition

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester – II, Paper – II
Paper Code: M2CP2
MATHEMATICAL ANALYSIS

UNIT I: Fourier Series, Beta and Gamma Functions

Definition of Fourier Series and orthogonal systems of functions – Minimum property of partial sums – Bessel's inequality – Dirichlet kernel – A theorem on point wise convergence of Fourier Series – Perseval's theorem – The Gamma Function: Definition of Gamma function and its properties – Beta function and its connection with Gamma function
(Chapter 8: Sec 8.9 to 8.14 and 8.16 to 8.21 of Text Book 1)

UNIT II: Improper Integrals

Convergence at the left and right end – Convergence at both the end point – General case – Convergence at ∞ and $-\infty$ - General case – The necessary and sufficient condition for the convergence of the improper integral $\int_a^b f(x)dx$ - Comparison test – A useful comparison integral – Convergence of Beta function – General test for convergence – Absolute convergence. Convergence of $\int_a^\infty f(x)dx$ - A useful comparison integral – Convergence of Gamma function – General test for convergence – Absolute convergence – Abel's and Dirichlet's theorems
(Chapter 9: Sec 9.1 to 9.9.2 of Text Book 2)

UNIT III: Functions of Several Variables

Definition of Limit and Continuity of real valued functions, Uniform Continuity – Intermediate value theorem.

Partial derivatives – Existence of directional derivatives – Mean value theorem
Differentiability: Necessary and sufficient condition for differentiability – Partial derivatives of higher order. Schwarz's and Young's theorem - Taylor's theorem – Extreme values.
(Chapter 12: Sec12.1 to 12.7, Chapter 13: Sec 13.1 to 13.6.1 and 13.8 to13.9 of Text Book 2)

UNIT IV : Invertible, Implicit Functions and Integrals as Functions of a Parameter

Invertible and Implicit Functions: Definition of locally invertible transformations – Jacobian of transformation – Linear transformations –Inverse function theorem(Statement only) – Implicit function theorem for the case of two variables and its applications for the existence of unique solutions of equations.

Integrals as Functions of a Parameter: Definite integral as function of a parameter – Theorems on continuity and inversion of differentiation and integration – Limits of integration as functions of y – Inversion of the order of integration - Uniform convergence of improper integrals – Test for uniform convergence – Inversion of the order of integration - Interchange of differentiation and integration
(Chapter 14: Sec 14.1 to 14.3.1, 14.5 to 14.7 and Chapter 15 of Text Book 2)

Text Book:

1. Principles of Mathematical Analysis by Walter Rudin, MgGraw Hill.
2. A Course of Mathematical Analysis by Shantinarayan and Mittal, S.Chand Publications

Reference Books:

1. Mathematical Analysis by Tom Apostle, TMH
2. Principles of Real Analysis by S.C.Malik and Savitha Arora, Newage International.

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester - II
Paper –III
Paper Code: M2CP3
TOPOLOGY

UNIT I

Topological spaces: The definition and examples - Elementary concepts - Open bases and Open-sub bases - Weak topologies. If f and g are real or complex continuous functions defined on a topological space then f+g, f.g and αg (α, scalar) are continuous. Any uniform limit of continuous functions is continuous.
(Chapter 3 : Sec 16 to 20 of the Text Book)

UNIT II

Compactness: Compact spaces - Products of spaces - Tychnoff's theorem - Generalized Heine-Borel theorem - Compactness for metric spaces.
(Chapter 4 : Sec 21 to 24 of Text Book)

UNIT III

Separation: T_1-Spaces and Hausdorff spaces - Completely regular spaces and normal spaces - Statements of Uryshon's lemma and Tietz-extension theorem.
(Chapter 5 : Sect 26 to 28 of Text Book)

UNIT IV

Connectedness: Connected spaces - The Components of a space - Totally disconnected spaces.
(Chapter 6 : Sec 31 to 33 of Text Book)

Text Book:

Introduction to Topology and Modern Analysis by G. F. Simmons, Tata McGraw-Hill

Reference Books:

1. Topology by James R. Munkres, 2nd Edition, Pearson Education, Asia(2001).
2. Introduction to General Topology by K.D.Joshi, Wiley Eastem.
3. Topology by J.L.Kelly, Van Nostrad, Princeton.
4. Elements of General Topology by S.T. HU, Holden day Inc.

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester - II
Paper – IV
Paper Code: M2CP4
COMPLEX ANALYSIS

UNIT I

Origin of complex numbers – Basic algebraic properties – Different types of representations – Conjugates – Modulus – Roots of complex numbers – Regions in complex plane
(Sec 1 to 11 of Text Book)
(No question is to be set from this part)
Functions of complex variable – Limits – Continuity – Derivatives – Differentiation formulas – Cauchy-Riemann equations – Sufficient condition for differentiability – Polar coordinates
(Sec 12, 15, 16, 18, 19, 20, 21, 22, 23 of Text Book)

UNIT II

Analytic functions – Harmonic functions – Derivatives of functions W(t) – Definite integrals W(t) – Cantours – Cantour integrals – Upper bounds for moduli of Cantour integrals – ML inequality – Anti derivatives – Cauchy-Goursat theorem – Simply and Multiply connected domains
(Sec 24, 25, 26, 37, 38, 39, 40 to 49 of Text Book)

UNIT III

Cauchy integral formula – An extension of the Cauchy integral formula – Some consequences of the extension – Liouville's theorem – Fundamental theorem of algebra – Maximum modulus principle – Convergence of sequences – Convergence of series – Taylor series – Laurent series - Isolated singular points – Residues – Cauchy Residue theorem
(Sec 50 to 63, 68, 69, 70 of Text Book)

UNIT IV

The three types of isolated singular points – Residues of Poles – Examples – Zeros of analytic functions(Theorem 1 only) – Zeros and Poles – Behaviour of functions – Near isolated singular points – Evaluation of improper integrals - Argument principle – Roche's theorem – Examples
(Sec 72 to 79, 86 to 87 of Text Book)

Text Book:

Complex Variables and Applications by J.W.Brown and R.V.Churchill, 8th Edition.

Reference Books:

1. Complex Variables by H.Silverman
2. Complex Variables by J.N.Sharma
3. Complex Variables by M.L.Khanna

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester - II
Paper – V
Paper Code: M2CP5

SPECIAL FUNCTIONS

UNIT I

Legendre's equation and its solution – Legendre's function of the first kind – Generating function for Legendre polynomials – Orthogonal properties of Legendre's polynomials – Recurrence relations – Beltrami's result – Rodrigues's formula – Legendre's series for a polynomial Expansion of function f(x) in a series of Legendre's polynomial – Even and odd function
(Chapter 9: Sec 9.1 to 9.3, 9.8 to 9.10, 9.13 to 9.19 of Text Book)

UNIT II

Bessel's equation and its solution – Bessel's function of the first kind of order n – List of important results of Gamma function and beta function – Bessels's function of the second kind of order n – Recurrence relations – Generating function for Bessels's function $J_n(x)$ – Orthogonality of Bessels's function – Bessel-sereis or Fourier Bessel expansion of f(x).
(Chapter 11: Sec 11.1 to 11.5, 11.6A, 11.7, 11.7A, 11.7B, 11.8, 11.10, 11.11A of Text Book)

UNIT III

Hermite's equation and its solution – Hermite polynomial of order n – Generating function for ermite polynomials – Alternative expressions for the Hermite polynomials – Hermite polynomials $H_n(x)$ for some special values of n – Evaluation of values of $H_{2n}(0)$ and $H_{2n+1}(0)$ – Orthogonality properties – recurrence relations
(Chapter 12 of Text Book)

UNIT IV

Laguerre's equation and its solution – Laguerre polynomial of order (or degree) n – Alternetive definition of Laguerre polynomial of order (or degree) n – Generating function for Laguerre polynomials – Alternative expression for the Laguerre polynomials – First few Laguerre polynomials – Orthogonal properties of Laguerre polynomials – Expansion of a polynomial in a series of Laguerre polynomials – Relations between Laguerre polynomials and their derivatives.
(Chapter 13 of Text Book)

Text Book:

1. Advanced Differential Equations- M.D. Raisinghania

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS syllabus(w.e.f. 2019-20)
Semester - III
Paper – I
Paper Code: M3CP1
MEASURE AND INTEGRATION

UNIT I

Algebra of sets – Borel sets
Measurable Sets: Outer Measure - Properties of Outer Measure - Measurable Sets and Lebesgue Measure - Properties of Measurable Sets - Sequences of Measurable sets - A Nonmeasurable Set.
(Sec 1.4, 2.7, Chapter 3: Sec1 to 4 of the Text Book)

UNIT II

Measurable Functions: Properties of Measurable Functions - Sequences of Measurable Functions - Almost everywhere concept - Measurability of a Characteristic Function - Simple and Step Functions - Egoroff's Theorem.
Lebesgue Integral: The Riemann Integral - The Lebesgue Integral of a Bounded Measurable Function over a Set of Finite Measure - The necessary and sufficient condition for measurability of bounded function - Properties of integral of bounded measurable functions - Bounded convergence Theorem.
(Chapter 3: Sec 5 to 6 and Chapter 4: Sec 1to 2 of the Text Book)

UNIT III

The Lebesgue in Integral of a Nonnegative Function: Properties of Integral of Nonnegative functions - Fatou's Lemma - Monotone Convergence Theorem - Some propositions related to Integrals - The General Lebesgue Integral - Properties of Lebesgue Integrals - Lebesgue Dominated Convergence Theorem.
(Chapter 4: Sec 3 to 4 of the Text Book)

UNIT IV

Differentiation and Integration: Statement of Vitali Covering lemma - The four Dini's derivatives of a function – Functions of bounded variation - A theorem on integral of a differentiable function - Differentiation of an Integral - Absolute Continuity.
(Chapter 5: Sec 1to 4 of the Text Book)

Text Book:
Real Analysis by H.L.Royden, PHI, 3rd Edition

Reference Books:
1. Measure Theory by P.R.Halmos, Vaan Nostrand, Princeton.
2. An Introduction to Measure and Integration by Inder K. Rana, Narosa Publications.

KAKATIYA UNIVERSITY
M.A. / M.Sc. MATHEMATICS Syllabus(w.e.f. 2019-20)
Semester –III
Paper –II
Paper Code: M3CP2
FUNCTIONAL ANALYSIS

U N I T I

Banach Spaces: The definition and some Examples - Continuous Linear Transformations - The Hahn-Banach Theorem - The Natural imbedding of N in N**

U N I T I I

The Open Mapping Theorem - The Conjugate of an Operator.
Hilbert Spaces: The Definition and some Examples - Orthogonal Complements.

U N I T III

Orthonormal Sets - The Conjugate Space H* - The Adjoint of an Operator - The Self-Adjoint Operators.

U N I T IV

Normal and Unitary Operators – Projections - The Spectral Theorem.

Text Book :

Introduction to Topology and Modern Analysis by G.F. Simmons.

Reference Books:

1. Functional Analysis by G. Backmenn and Narici
2. Functional Analysis by P.K. Jain IP, Ahuja and Khalil Ahmed.
3. Introductory Functional Analysis with Applications by E. Kreyszig.
4. Functional Analysis by B.V. Limaye.
5. A First Course in Functional Analysis by G. Goffman and G. Pedick Prentice Hall of India.

.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus(w.e.f.2019-20)
Semester –III
Paper –III
Paper Code: M3CP3

PARTIAL DIFFERENTIAL EQUATIONS

U N I T - I: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS

Formation of First Order Partial Differential Equations – Solution of Linear First Order Partial Differential Equations (Langrange's Method)- Integral Surfaces Passing Through a Given Curve - Surfaces Orthogonal to a Given System of Surfaces-Compatibility of First Order Partial Differential Equations – Classification of the Solutions of First Order Partial Differential Equations - Solutions of Non-Linear Partial Differential Equations of First Order – Charpit's Method - Jacobi's Method - Special Types of First Order Equations .
[Sections 1.1 to 1.9.3 of text book.]

U N I T - I I: SECOND ORDER PARTIAL DIFFERENTIAL EQUATIONS.

Second order Partial Differential Equations – Origin – Linear Partial Differential Equations with Constant Coefficients - Methods of Solving Linear Partial Differential Equations – Classification of Second Order Partial Differential Equations - Classification of Second Order Partial Differential Equations.
[Sections 2.1 to 2.4.1 of text book.]

U N I T - III : ELLIPTIC DIFFERENTIAL EQUATIONS

Boundary Value Problems – Separation of Variable method - Laplaces equation in Cylindrical and Spherical coordinates - Interior and exterior Dirichlet problem for a circle – Interior Dirichlet problem for a Sphere- Interior Neumann problem for a Circle - Miscellaneous examples.
[Sections.3.2 to 3.10 (3.10.1,3.10.2,3.10.3]

U N I T – IV: PARABOLIC DIFFERENTIAL EQUATIONS

Solution of Diffusion by Separation of Variables Method - Diffusion Equation in Cylindrical and Spherical coordinates – D'Alembert solution of one dimensional Wave Equation – Separation of Variable Method - Two Dimensional Wave Equation – Separation of Variable Method- Two Dimensional Wave Equation
[Sections 4.1, 4.2, 4.3, 4.4, 5.3, 5.4, 5.5, 5.10.]

Text Book:

Partial Differential Equations for Engineers and Scientists by J.N. Sarma and Kehar Singh Published by Narosa Publishing House.

Reference Books:

1. Elements of partial Differential Equations by I.N. Sneddon
2. Partial Equations by L.C Evans.
3. Partial Differential Equations by Prasad & Ravindran.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –III
Paper –IV (Elective)
Paper Code: M3OP4(1)

Mathematical Programming

UNIT I

Hyper planes – Hyper spheres – Convex sets and their properties –Mathematical formulation of a LPP - Graphical solution method- General LPP - Canonical and Standard form of a LPP. Basic solution – Degenerate solution – Basic feasible solution – Improved basic feasible solution - Optimum basic feasible solution – Fundamental properties of solutions-Reduction of a feasible solution to a basic feasible solution – Fundamental theorem of linear programming - Improved basic feasible solution - Existence of unbounded solution – Conditions of optimality – The Simplex algorithm.

UNIT II

Use of Artificial Variables – Two-Phase Method - Big M-Method – Degeneracy in linear programming - Duality – General Primal-Dual pair – Formulating a Dual problem – Primal-Dual pair in matrix form - Duality theorems – Duality and Simplex method - Dual simplex method.

UNIT III

Transportation problem- Matrix form of T.P. – special case of LPP Transportation table-Initial Basic Feasible Solution – North West Corner Rule, Matrix - Minima Method, Vogel approximation method of finding initial basic feasible solution – loops in a T.P. – Transportation Algorithm of finding optimal solution - Degeneracy in T.P. – Unbalanced T.P.

UNIT IV

Assignment problems – Hungarian method of finding optimal assignment problems – Travelling Salesman Problem.
Integer programming – all & mixed integer programming problems- Gomory's All IPP method- Gemory's mixed integer programming – branch and bound method .

Text-Book:

Operations Research by Kanti Swarup. P.K.Gupta and Manmohan.

Reference Books:

1. Operations Research by Handy A.Taha. Printice Hall of India.
2. Linear programming methods and applications by Gass. S.I

KAKATIYA UNIVERSITY
M.A/M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester - III
Paper – IV (Elective)
Paper Code: M3OP4(2)
NUMERICAL ANALYSIS

U N I T I

Initial Value Problems for Ordinary Differential Equations**:** The Elementary Theory of Initial Value Problems – Euler's Method – Higher-Order Taylor Methods – Runge-Kutta Methods – Multistep Methods.

U N I T I I

Direct Methods for solving Linear Systems: Linear system of equations-Matrix Factorizatoin-Special Types of Matrices-Iterative Techniques in Matrix Algebra –The Jacobi and Gauss-Seidel Iterative Techniques.

U N I T III

Numerical Solutions of Nonlinear Systems of Equations : Fixed Points for Functions of Several Variables – Newton's Method – Quasi-Newton Methods – Steepest Descent Techniques.

U N I T IV

Boundary-Value Problems for Ordinary Differential Equations **:** The Linear Shooting Method – The Shooting Method for Nonlinear Problems – Finite-Difference Methods for Linear Problems – Finite-Difference Methods for Nonlinear Problems

Text Book :

Numerical Analysis by Richard L.Burden and J.Douglas Faires, 9th Edition, Brooks/Cole, Cengage Learning

Reference books:

1. Introductory Methods of Numerical Analysis, by S.S. Sastry, PHI.
2. Numerical Methods for Scientific and Engineering Computation byM. K.Jain, S.R.K. Iyengar and R.K.Jain.

.

KAKATIYA UNIVERSITY
M.A. /M.SC. MATHEMATICS Syllabus(w.e.f. 2019-20)
Semester –III
Paper –IV(Elective)
Paper Code: M3OP4(3)
AUTOMATA AND LANGUAGES

UNIT I

Mathematical Preliminaries: Sets, relations and functions – Graph – Trees - Strings and their properties - Principle of induction.
The theory of Automata: Definition of automation - Description of a finite automation - Transition systems.
(Chapter 1: Sec 1.1 to1.4 and Chapter 2: Sec 2.1 to 2.2 of Text Book)

UNIT II

Properties of Transition functions: Acceptability of a string by a finite automation - Non deterministic finite state machines - The equivalence of DFA and NDFA - Mealy and Moore models - Minimization of finite automata.
(Chapter 2: Sec 2.4 to 2.9 of Text Book)

UNIT III

Formal Languages: Basic definitions and examples - Chomsky classification of languages and their relations - Recursive and recursively enumerable sets - Operations on languages and automata.
(Chapter 3: Sec 3.1 to 3.6 of Text Book)

UNIT IV

Regular Sets and Regular Grammars: Regular expressions - Finite automata and Regular expressions - Pumping Lemma for regular sets - Applications of Puming Lemma - Closure properties of regular sets - Regular sets and regular grammar.
(Chapter 4: Sec 4.1 to 4.6 of Text Book)

Text Book:

Theory Computer Science (Automata, Languages and Computation) by K.L.P. Mishra and N. Chandrasekhar, PHI

Reference Books:

1.Introductory theory of computer science by E.V.Krishna Murthy, East-West Press.
2. Theory of Finite Automates with an introduction to formal languages by Carrel J and Lang D,PHI

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –III
Paper –IV (Elective)
Paper Code: M3OP4(4)
ADVANCED COMPLEX ANALYSIS

UNIT I:

Harmonic Functions: Harmonic functions – Borel-Carathodary theorem – Poisson's integral formula – Positive harmonic functions – Harnack's functions – Harnack's inequality – Harnack's principle
(Chapter 10: Sec 10.1 to 10.3 of Text Book)

UNIT II:

Conformal mappings and Bilinear transformations: Introduction – Conformality theorem – Bilinear transformations – Special bilinear transformations – Exponential and trigonometric transformations – Normal families – Montel's theorem and Riemann mapping theorem(Statement only)
(Chapter 11 of Text Book)

UNIT III:

Univalent functions: Definition of univalent functions and elementary properties – Area theorem – Coefficient conjectures – Coefficient estimates – Growth and distortion theorems – Function with positive real part
(Chapter 12 of Text Book up to theorem 12.8)

UNIT IV:

Subclasses of S, Entire and Meromorphic Functions: Starlike functions – Convex Functions – Close to convex functions – Infinite products – Meromorphic functions – Weirstrass theorem
(Chapter 12: Sec 12.2 , Chapter 13: Sec 13.1, 13.2 of Text Book)

Text Book:

Complex Variables by H.Silverman

Reference Books:

1. Complex Variables Theory and Applications by H.S.Kasana
2. Univalent Functions by P.C.Duren
3. Univalent Functions by A.W.Goodman(Vol I & II)

KAKATIYA UNIVERSITY
K.A./M.Sc MATHEMATICS Syllabus (w.e.f.2019-20)
Semester-III
Paper-IV (Elective)
Paper Code: M3OP4(5)
COMMUTATIVE RINGS & MODULES

U N I T I

Modules – Homomorphisms - Exact Sequences- Free modules – Vector spaces
(Chapter 4: Sec 1 & 2 of Text Book)

U N I T I I

Projective Modules – Injective Modules – Hom & Duality
(Chapter 4: Sec 3 & 4 of Text Book)

U N I T III

Chain Conditions – Prime and Primary Ideals
(Chapter 8: Sec 1 & 2 of Text Book)

U N I T IV

Primary Decomposition - Noetherian Rings and Modules – Krull Intersection Theorem – Nakayamma lemma- Hilbert Basis Theorem.
(Chapter 8: Sec 3 & 4 of Text Book)

Text Book :

Algebra by Thomas Hungerford.

KAKATIYA UNIVERSITY
M.A./M.Sc MATHEMATICS Syllabus(w.e.f 2019-20)
Semester-III
Paper-IV(Elective)
Paper Code: M3OP4(6)
MECHANICS OF SOLIDS

UNIT I

Introduction to Tensors: Coordinate transformations - Summation Convention – Contravariant - Covariant and mixed tensors - Symmetric and skew symmetric tensor - Fundamental operations with the tensors - The line element and metric tensor - Tensor form of gradient, divergence and curl.
(Scope as in Text Book 1)
Analysis of Strain: Deformation - Affine transformations - Infinitesimal affine transformations - Geometrical interpretation of the components of strain - Strain quadric of Cauchy - Principal strain and strain invariants - Examples of strain - Equations of compatibility (a simple derivation).
(Chapter 1 of the Text Book 2)

UNIT II

Analysis of Stress: Body and surface forces - Stress tensor - Equations of equilibrium - Transformation of coordinates - Stress quadric of Cauchy - Maximum normal and shear stress - Mohr's diagram - Examples of stress.
(Chapter 2 of the Text Book 2)

UNIT III

Equations of Elasticity: Generalized Hooke's law - Homogeneous isotropic media - Elastic moduli for isotropic media - Simple tension - Pure shear and hydrostatic pressure - Equilibrium equations for an isotropic elastic solid - Dynamical equations for an isotropic elastic solid - The strain energy function and it's connection with Hooke's law - Uniqueness of solutions.
(Chapter 3 of the Text Book 2)

UNIT IV

Basic Problems of Elasticity: Statement of problem - Extension of beams by longitudinal forces - Beam stretched by its own weight - Bending of beams by terminal couples - Torsion of circular shaft - Torsion of cylindrical beams - Stress function.
(Chapter 4: Sec 29-35 of the Text book 2)

Text Book:

1. Vector Analysis (For Unit-I, a) Introduction to Tensors) – Murray R Spiegel, Schaum's Series.
2. Mathematical Theory of Elasticity – I.S.Sokolnikoff, TMG- New Delhi.

Reference Books:

1. Theory of Elasticity – S.P.Timoshenco, J.N.Goodier.
2. Theory of Elasticity – PDS. Verma, Vikas Publications.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –III
Paper – V (Elective)
Paper Code: M3OP5(1)
COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

UNIT I

Major Components of a Digital Computer - Computer Classification - User Interface - Hardware Software and Firmware - LAN and WAN.
Number System (Binary, Decimal, Octal and Hexadecimal) - Conversion of one Number System to another - Floating-Point Representation.
(Chapters 1, 2 of Text Book 1)

UNIT II

Constants – Variables – Data types – Operators – Expressions – Managing input and output operations
(Chapter 2, 3, 4 of Text Book 2)

UNIT III

Decision making and branching – Decision making and looping – Arrays - User defined function
(Chapters 5, 6, 7, 9 of Text Book 2)

UNIT IV

Structures and unions – Pointers - File management in C.
(Chapters 10, 11 and 12 of Text Book 2)

Text Book:

1. Computer Fundamentals, Architecture and Organization by B.Ram, 3rd Edition, New Age International (P) Limited.
2. Programming in ANSI C by E.Balagursamy, 4th Edition, Tata McGraw-Hill Education Pvt. Ltd.

Computer Lab Work

1. Program to print Biggest of 3 given numbers.
2. Program to print the roots of a quadratic equation
3. Program to print sum of N given numbers.
4. Program to print N prime numbers.
5. Program to check whether the given number is palindrome or not.
6. Implement functions to find whether a given number is prime or not.
7. Program to find the n^{th} Fibonacci number using recursion.
8. Program to multiply two matrices
9. Program to check whether the given string is palindrome or not.
10. Program to sort a given string.
11. Create a file of student records .
12. Program to swap two numbers using pointers.
13. Program to compute sum of elements stored in an array using pointers.
14. Program to read student records (name, roll, m1, m2, m3) as structure and sort according to name.
15. Program to read student records (name, roll, m1, m2, m3) as structure and print the result.

16. . Programs i)to create a file ii) to read the created file and display it contents..

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –III
Paper – V (Elective)
Paper Code: M3OP5(2)
OFFICE AUTOMATION AND C – LANGUAGE

UNIT I

MS-Office, MS-Word – Basics – Header – Footer – Tables – Graphics – Templates – Macros.
MS-Excel – Worksheet – Formatting – Functions – Charts – Graphs – Worksheets and Data Strings.
(Text Book 1)

UNIT II

Overview of C – Constants - Variables and Data types - Operators and Expressions - Managing Input and Output operations.
(Chapters 1, 2, 3 and 4 of Text Book 2)

UNIT III

Decision making and Branching - Decision Making and Looping – Arrays - Handling Character Strings - User Defined Functions.
(Chapters 5, 6, 7, 8 and 9 of Text Book 2)

UNIT IV

Structures and Unions – Pointers - File Management in C.
(Chapters 10, 11 and 12 of Text Book 2)

Text Book:

1.Working in MS-Office – By Ron Mansfeild, Tata McGrawHill.

2. Programming in ANSI C by E.Balagurusamy, Third Edition, Tata McGraw-Hill

Reference Book:

MS-OFFICE For everyone by Sanjay Saxena, Vikas Publication.

Computer Lab Work

1. Prepare Curriculum Vitea of a student.
2. Mail Merge.
3. Create graphs(Line, Pie and Bar) in Excel
4. Simple macros in Excel.
5. Program to print Biggest of 3 given numbers.
6. Program to print sum of N given numbers.
7. Program to check whether the given number is palindrome or not.
8. Implement functions to find whether a given number is prime or not.
9. Program to find the n^{th} Fibonacci number using recursion.
10. Program to multiply two matrices
11. Program to check whether the given string is palindrome or not.
12. Program to sort a given string.
13. Create a file of student records .
14. Program to swap two numbers using pointers.
15. Program to read student records (name, roll, m1,m2,m3) as structure and sort according to name.
16. Program to copy contents of one file to another file.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –III
Paper – V (Elective)
Paper Code : M3OP5(3)
NUMERICAL ANALYSIS Using C

UNIT I

Transcendental and polynomial equations: Introduction - Bisection Method - Secant Method - Regula-Falsi Method - Newton-Raphson Method - Mullar Method - Chebyshev Method - Multipoint Iterative Methods - Rate of convergence
(Chapter 2: Sec 2.1, 2.2, 2.3, 2.4 and 2.5 of the Text Book)

UNIT II

System of linear algebraic equations and eigen value problems: Introduction
Direct Methods: Gauss-Elimination Method - Gauss-Jordan Method - Triangularisation Method - Cholesky Method - Partition Method - Error analysis for direct methods
Iteration Methods: Jacobi Iteration Method - Gauss-Seidel Iteration Method - Eigen Values and Eigen Vectors - Power Method - Inverse Power Method.
(Chapter 3: Sec 3.1, 3.2, 3.3, 3.4, 3.5, 3.11 and 3.12 of the Text Book)

UNIT III

Interpolation and approximation: Introduction - Lagrange Interpolation - Newton Divided Differences - Quadratic Interpolation - Higher Order Interpolation - Iterated Interpolation - Finite Differences Operators
Interpolating Polynomials using finite differences: Gregory-Newton forward difference interpolation - Backward difference interpolation - Stirling and Bessel interpolation - Hermite interpolation - Spline interpolation
Approximation: Least square approximation.
(Chapter 4: Sec 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 and 4.9 of the Text Book)

UNIT IV

Numerical differentiation and integration: Introduction
Numerical Differentiation: Linear interpolation - Quadratic interpolation - Methods based on finite differences - Methods Based on Undetermined Coefficients - Numerical Integration Methods Based on Interpolation: Newton-Cotes Methods - Open type integration Rules Composite Integration Methods: Romberg Integration - Double Integration.
(Chapter 5: Sec 5.1, 5.2, 5.6, 5.7, 5.9, 5.10 and 5.11 of the Text Book)

Text Book:

Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar, R. K. Jain, 5th Edition, New Age International (p) Limited Publishers

Reference Book:

An Introduction to Numerical Analysis by Kendall E. Atkinson

Numerical Analysis Laboratory

The following programs are to be executed in C/Fortran language.

1. Solution of system of n x n linear equations AX=B using Gauss Elimination method.
2. Finding solution of n x n linear equations AX=B using LU decomposition method.
3. Finding solution of n x n linear equations AX=B using Gauss-Seidel iteration method.
4. Finding the largest Eigen value in magnitude and the corresponding Eigen vector of an n x n matrix A by Power method.
5. Lagrange interpolation.
6. Newton-Gregory forward interpolation.
7. Newton-Gregory backward interpolation.
8. Evaluation of the integral of f(x) between the limits 'a' and 'b' using Trapezoidal rule with 'n' subintervals.
9. Evaluation of the integral of f(x) between the limits 'a' and 'b' using Simpson's $1/3^{rd}$ rule with '2n' subintervals.
10. Evaluation of the integral of f(x) between the limits 'a' and 'b' using Simpson's $3/8^{th}$ rule with '3n' subintervals.
11. Solution of equation by Bisection method.
12. Solution of equation by Regula-Falsi method.
13. Solution of equation by Newton-Raphson method.
14. Solution of equation by Mullar method.

Text/Reference Books:

1. Numerical methods for scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar and R. K. Jain.
2. Numerical methods by E. Balagurusamy.
3. Computer oriented Numerical methods by V. Raja Raman.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – I
Paper Code: M4CP1
ADVANCED LINEAR ALGEBRA

Review of Vector Spaces-Subspaces- Bases and Dimension-Coordinates.

UNIT I

Linear Transformations-The algebra of Linear Transformations – Isomorphism - Representation of Transformations by Matrices - Linear Functionals.
(Chapter 3: Sec 3.1 to 3.5 of the Text Book)

UNIT II

The double Dual - Characteristic Values - Annihilating Polynomials - Cayley Hamilton Theorem-Invariant Subspaces.
(Chapter 3: Sec 3.6, Chapter 6: Sec 6.1 to 6.4 of the Text Book)

UNIT III

Direct-sum Decompositions - Invariant Direct sums - The primary Decomposition theorem-Cyclic Subspaces and Annihilators – Statement of Cyclic Decompositions Theorem and its applications (except Generalized Cayley -Hamilton Theorem)- Rational Form.
(Chapter 6: Sec 6.6 to 6.8, Chapter 7: Sec 7.1 to 7.2 of the Text Book)

UNIT IV

Bilinear Forms: Bilinear forms - Symmetric Bilinear Forms - Skew Symmetric Bilinear Forms - Groups preserving Bilinear Forms
(Chapter 10: Sec 10.1 to 10.4 of the Text Book)

Text Book:

Linear Algebra by Kenneth Hoffman and Ray Kunze, 2nd Edition, Pearson (2003).

Reference Books:

1. Finite Dimensional Vector Spaces by p.Halmos,D Vanostrand,Princeton.
2. Linear Algebra by H.Friedberg etal, PHI(2007)
3. Linear Algebra by Lipschitz, Schaum Series.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – II
Paper Code: M4CP2
GRAPH THEORY

U N I T – I

Relations and Digraphs

Relations and Digraphs – Special Properties of Binary Relations – Equivalence Relations – Ordering Relations – Lattices and Enumerations – Paths and Closures – Directed Graphs and Adjacency Matrices

U N I T –I I

Graphs

Basic Concepts – Isomorphism and Subgraphs – Trees and their properties – Spanning Trees – Directed Trees – Binary Trees – Planar Graphs.

U N I T – III

Multigraphs

Euler's Formula – Konigsberg Seven Bridges problems – Multigraphs – Euler Circuits – Hamiltonian Graphs – Chromatic Numbers – The Four–Colour Problem.

U N I T – IV

Net works flows

Graphs as Models of Flow of Commodities – Flows – Maximal Flows and Minimal cuts- The Maxflow Min- Cut Theorem – Applications – Matching and Hall's Marriage Theorem.

TEXT BOOK :

Discrete Mathematics for Computer Scientists and Mathematicians By J.L. Mott. A. Kandle, P.Bakes.

REFERENCE BOOKS :

1. A First Book at Graph Theory – By John Clark and Derek Allan Hotton.
2. Discrete Mathematical Structures & Graph Theory – By Rao
3. A Text Book of Graph Theory and its applications – By B. Suryanarayana and G.K. Ranganath.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – III
Paper Code: M4CP3
INTEGRAL EQUATIONS AND TRANSFORMS

UNIT I

Integral Equation – Differentiation of a Function under an Integral Sign – Relation Between Differential and integral Equations – Solution of Non-homogeneous Volterra's Integral Equations by the method of Successive Substitution and Successive Approximation of some Resolvent Kernels – Volterra Integral Equation of First Kind.
(Sec 1.1 to 2.4 of Text Book 1)

UNIT I I

Solution of the Fredholm Integral Equation by the Method of Successive Substitution and successive approximation – Reciprocal Functions - Volterra's Solution of Fredholm's Equation – Statement of Fredholm first Theorem- Statement of Unique Solution of the Non-homogeneous Fredohlm Integral Equation – Integral equations with degenerate kernels - Symmetric Kernel – Eigen value of a Symmetric kernel- Real Characteristic Constants.
(Sec 2.5 to 2.9, 3.1, 3.2, 3.14 and 4.1, 4.4, 4.5. of Text Book 1)

UNIT III

Laplace Transforms – Existence of Laplace Transform – Properties of Laplace Transform- The inverse Laplace transform and properties – Convolution Theorem- Solution of ordinary differential Equations by Laplace Transforms- Solution of Ordinary Differential Equations with variable coefficients by Laplace Transforms.-
(Chapter 1, Chapter 2: Sec 2.1 to 2.15, Chapter 3: Sec 3.1, 3.2, of Text Book 2)

UNIT IV

Fourier Transforms – Fourier Integral Formula – Inversion Theorem for Complex Fourier Transform -Fourier Sine and Cosine Transform - Inversion of Formulae – Convolution Theorem-Parseval's identity -Finite Fourier Sine and Cosine Transforms - Inversion Formulae -Operational Properties – Convolution.
(Chapter 6:Sec 6.1 to 6.15, 6.17, 6.18, 6.19,Chapter7: Sec 7.1 to 7.4, 7.6, 7.7, 7.9, of Text Book 2)

Text Book:

1. Integral Equations by Shanty Swarup
2. Integral Transforms by A. R Vasistha and R.K. Gupta

Reference Book:

Advance Calculus for Applications by Francis B. Hilder Brand Prentic Hall of India

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – IV (Elective)
Paper Code: M4OP4(1)
NEAR RINGS

U N I T I

The Structure Of Near –Rings: Near-ring - The Near-Ring of all mappings on a group G - The Near-Ring of all zero respective mappings on G - Sub-Near-Ring - Abelian Near-Ring - Commutative Near-Ring - Zero Near-Ring - Zero Symmetric Near-Ring - Constant Near-Ring - Trivial Zero Symmetric Near-Ring and Trivial Constant Near-Ring - Near-ring homomorphism and isomorphism - Ideal (left, right) of a Near-Ring - Quotient Near-Ring - Natural homomorphism associated with an Ideal - Kernel of homomorphism - R-sub group (left, right) of a Near-Ring R - Simple Near-Ring.
(Chapter 1: Sec 1.1 to 1.40 of the Text Book)

U N I T II

Near-Ring Modules: R-module - Faithful representation - Centralizer Near-Ring - The right regular representation of a Near-Ring - R-sub module - Unital R-module - R-module homomorphism and isomorphism - Quotient R-module - Annihilator of a subset.
(Chapter 2: Sec 2.1 to 2.37 of the Text Book)

U N I T III

Primitive Near-Rings: Momogenic Near-Ring - R-module of type 0 - R-module of type 1 - R-module of type 2 - V-primitive Near-Ring - The Stabilizer.
(Chapter 3: Sec 3.1 to 3.37 of the Text Book)

U N I T IV

More on 2-Primitive Near-Rings: Rank – Projection - Minimal condition - Maximal condition – DCCS – DCCR – DCCI – ACCR – ACCI
(Chapter 4: Sec 4.1 to 4.28 of the Text Book)

Text Book:

Near-Rings and their links with groups by J.D.P.Meldrum.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – IV (Elective)
Paper Code: M4OP4(2)
THEORY OF ORDINARY DIFFERENTIAL EQUATIONS

U N I T I

System of Linear Differential Equations: Introduction system of First order Equations - Existence and Uniqueness theorem - Fundamental Matrix - Non Homogenous Linear System - Systems with Constant Coefficients – Linear Systems with Periodic Co-efficient
(Chapter 4: Sec 4.1 to 4.7 of Text Book)

U N I T I I

Existence and Uniqueness of Solutions : Introduction – Preliminaries - Successive Approximations - Picard's Theorem - Non Uniqueness of Solutions - Continuation and Dependence on initial conditions - Existence of Solutions in the large - Existence and Uniqueness of Solutions of Systems.
(Chapter 5: Sec. 5.1. to 5.8 of Text Book)

U N I T III

Behavior of Solutions of linear Differential Equations : Introduction - n^{th} order - Elementary Critical Points - Critical Points of Non-Linear system - Linear Systems with Constant-coefficient - Linear Systems with variable Co-efficient - Second Order Linear Differential Equations .
(Chapter 5 & 6 of Text Book)

U N I T IV

Stability Non-Linear systems : Introduction - Stability of Quasi- Linear Systems - Stability of Autonomous Systems - Stability of Non- Autonomous Systems - A special Lyapanov Function
(Chapter 9: Sec 9.1 to 9.5 of Text Book)

Text Book:

Ordinary Diff. Equations and Stability Theory by S.G. Deo, V. Ragvendra and V.Laxmi Kantham.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – IV(Elective)
Paper Code: M4OP4(3)

OPERATIONS RESEARCH

UNIT I:
Sequencing and Scheduling: Sequencing Problem – The Problem of n Jobs and Two Machines – Problem with n Jobs and m Machines – General Problem of n Jobs and m Machines - Scheduling – Critical Path Determination by CPM – Critical Path Determination by PERT – Optimum Scheduling by CPM.
(Chapter 7 of Text Book1)

UNIT II
Queueing Theory – Introduction – Queueing system – Elements of a Queueing system – Operating characteristics of a Queueing system – Deterministic Queueing system – Probability distributions in Queueing systems – Classification of Queueing Models – Definition of Transient and Steady States – Poisson Queueing systems.
(Chapter 21: Sec 21.1 to 21.9 of Text Book 2)

UNIT III
Dynamic Programming – Introduction – The recursive equation approach – Characteristics of Dynamic Programming – Dynamic Programming Algorithm – Solution of L.P.P. by Dynamic Programming.
(Chapter13: Sec 13.1 to 13.4, 13.7 of Text Book 2)

UNIT- IV
Non-Linear Programming – General Non – Linear Programming Problem – Constrained Optimization with Equality Constraints - Constrained Optimization with Inequality Constraints – Non – Linear Programming Methods – Graphical Solution – Quadratic Programming – Wolfe's Modified Simplex Method – Beale's Method.
(Chapter 27: Sec 27.3 to 27.5, Chapter 28:Sec 28.1, 28.2, 28.4 to 28.6 of Text Book 2)

Text Book:

1. Introduction to Optimization Operations Research by J.C.Pant(6^{th} Edition)
2. Operations Research by Kanthi Swarup, P.K.Gupta, Man Mohan, Sultan Chand & Sons

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper –IV (Elective)
Paper Code: M4OP4(4)

Computational Methods for Partial Differential Equations

UNIT I

Partial Differential Equations – Introduction – Difference Method – Routh Hurwitz Criterion – Domain of Dependence of Hyperbolic Equations.
(Chapter 1: Sec 1.1 to 1.4 of Text Book)

UNIT II

Difference Methods for Parabolic Differential Equations – Introduction – One Space Dimension – Two Space Dimensions – Spherical and Cylindrical Coordinate System.
(Chapter 2: Sec 2.1 to 2.3, 2.5 of Text Book)

UNIT III

Difference Methods for Hyperbolic Partial Differential Equations – One Space Dimensions – Two Space Dimensions – First Order Equations.
(Chapter 3: Sec 3.1 to 3.4 of Text Book)

UNIT- IV

Numerical Methods for Elliptic Partial Differential Equations – Introduction – Difference Methods for Linear Boundary Value Problems – General Second Order Linear Equation – Equation in Polar Coordinates.
(Chapter 4: Sec 4.1 to 4.4 of Text Book)

Text Book :

Computational Methods for Partial Differential Equations by M.K.Jain, S.R.K.Iyengar, R.K.Jain, Wiley Eastern Limited, New Age International Limited, New Delhi

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper –IV (Elective)
Paper Code: M4OP4(5)
AUTOMATA AND MACHINES

U N I T I

Context - Free Languages : Context – Free languages – Derivation Tress- Ambiguity in Context – Free Grammers – Simplification of Context – Free Grammers – Comosky Normal Form of Context - Free Grammars – Pumping Lemma for context – Free Languages- Decision Algorithms for Context – Free Languages.

U N I T I I

Pushdown Automata : Basic Definitions – Acceptance by Pda – Pushdown Automata and Context Free Languages- Parsing and Push Down Automata.

U N I T III

Turning Machines And Linear Bounded Automata: Turning Machine Model – Representation of Turning Machines – Language Acceptability by Turing Machines – Design of Turing Machines – Universal Turing Machines and their Modifications. The Model of Linear Bounded Automation – Turing Machines and Type O Grammers.

U N I T IV

Linear Bounded Automata and languages – Halting Problem of Turning Machines – NP – Completeness – LR (K) Grammers – Properties of LR(K) Grammars – Closure Properties of Languages.

Text Book:

Theory of Computer Science (Automata, languages and Computation) by KLP Mishra and N.Chandrasekhar, Printice Hall of India.

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper –IV (Elective)
Paper Code: M4OP4(6)
THEORY OF RELIABILITY

UNIT I
Reliability – Definition of Reliability - Failure Data Analysis – Failure data – Mean failure rate – Mean time to failure – Mean time between failures – Graphical plots – MTTF in terms of failure density – Generalization - Reliability in terms of Hazard rate and failure density – Mean time to failure in integral form - Hazard Models: Constant Hazard, Linearly increasing Hazard – The Weibull model – Distribution functions and reliability analysis – Some important distributions - Expected value — Standard deviation and variation.
(Chapter 2, Chapter 3: Sec 3.1 to 3.11, Chapter 4: Sec 4.1 to 4.4, 4.6, 4.7, 4.9, 4.10 of Text Book1)

UNIT II
Interference Theory and Reliability Computations – General expression for reliability – Reliability computation for normally distributed stress and strength – Reliability computation for Log normally distributed stress and strength – Reliability computation for exponentially distributed stress and strength - Reliability computation for normally(exponentially) distributed strength and exponentially(normally) distributed stress - Reliability computation for gamma distributed stress and strength- Reliability computation for weibull distributed stress and strength.
(Chapter 6: Sec 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.8 of Text Book 2)

UNIT III
System Reliability – Series configuration – Parallel configuration – Mixed configuration – Application to specific hazard models – An r-out of –n structure – Methods of solving complex systems – Systems not reducible to mixed configuration - Mean time to failure of systems - Logic diagrams – Markov models – Markov graphs.
(Chapter 6: Sec 6.1 to 6.12 of Text Book 1)

UNIT IV
Reliability improvement – Improvement of components – Redundancy - Element Redundancy - Unit Redundancy - Standby Redundancy.
Maintainability and availability - Maintainability – Availability.
Repairable systems – Instantaneous repair rate – Mean time to repair – Reliability and availability functions.
(Chapter 7: Sec 7.1 to7.6, Chapter 9: Sec 9.1 to 9.3, chapter 10 of Text Book 1)

Text Books:
1. Reliability Engineering by L.S. Srinath, Fourth edition, East-West Press Private Limited.
2. Reliability in Engineering Design by K.C.Kapur, L.R.Lamberson, John Wiley & Sons, Inc.

Reference Books:
Reliability Engineering by E.Balagurusamy, Tata McGraw-Hill Publishing Company Limited.

M4OP5(1)

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – V (Elective)
Paper Code: M4OP5(1)
PROGRAMMING METHODOLOGY

U N I T I

Algorithms – Data-Data types and primitive operations – Variables and Expressions - From Algorithms to Programs Decisions Structures – Looping – Use of Compound conditions – Case Statement Applications

U N I T II

Sub Algorithms – Argument – Parameter Correspondence – Recursive Sub algorithms – Applications composite Date Structures One- Dimensional Arrays – Sorting and Searching with Vectors – Application of Vectors.

U N I T III

Higher – Dimensional Arrays – Application of Arrays – Files – Linear Data Structures – Linear Lists- Storage Structure Concepts – Sequential Storage Structure for Arrays – Application of Stacks – Queues.

U N I T IV

Non-Linear Data Structures – Trees – General Trees – Application of Trees- Graphs.

Text Book :

Introduction to Computer Science by Trembay and Bunt.

Lab Work :

Simple programs in C on the above Structures

Pattern of Lab Training.

The total number of students are made into batches. The number of students in each batch should not more than students and each batch should be handled by two teachers

M4OP5(2)

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – V (Elective)
Paper Code: M4OP5(2)
PROGRAMMING IN C++

U N I T I

Input and Output in C++-C++ Declarative control Structures .
(Chapters 2, 3 and 4 of Text Book)

U N I T I I

Functions in C++ - Classes and Objects.
(Chapters 5 and 6 of Text Book)

U N I T III

Constructors and Destructors – Operator Overloading and Type conversion – Inheritance
(Chapters 7, 8 and 9 of Text Book)

U N I T IV

Pointers and Array – C++ and Memory – Binding , Polymorphism and Virtual Functions
(Chapters 10, 11 and 12 of Text Book)

Text Book:

Object-Oriented Programming with ANSI & Turbo C++ by Ahok. N. Kamthane.

Lab Work:

Simple programs in C ++ on the above topics.

Pattern of Lab Training :

The total number of students are made into batches. The number of students in each batch should not be more than 10 students and each batch should be handled by two teachers.

M4OP5(3)

KAKATIYA UNIVERSITY
M.A. /M.Sc. MATHEMATICS Syllabus (w.e.f.2019-20)
Semester –IV
Paper – V (Elective)
Paper Code: M4OP5(3)
APPLIED STOCHASTIC PROCESS WITH MAT LAB

UNIT I

Stochastic Process: Some Notations – Introduction - Specifications of Stochastic Process - Stationary process.
(Sec 2.1, 2.2 & 2.3 of Text Book 1)
Markov chains: Definition and Examples - Transition Matrix - Order of Markov chains - Markov chain as graphs - Higher transition probabilities - Classification of States and chains – Irreducible chain - periodic chain - transient and recurrence states - first passage time distributions - stability of Markov system - Stationary distribution - Ergodicity.
(Sec 3.1, 3.2, 3.4, 3.6 of Text Book 1)

UNIT II

Markov Process with Discrete State Space - Poison process - Poisson process and related distributions - Continuous Time Markov Chain (CTMC).
(Sec 4.1, 4.2 & 4.5 of Text Book 1)

UNIT III

Finite Markov Chains and its Applications: Finite Markov chains with recurrent & transient States - Irreducible finite Markov Chains with Ergodic states , statistical inference.
(Sec 5.1, 5.2 & 5.3 of Text Book 2)

UNIT IV

Stationary Process and Time Series : Introduction - Models of time series - Time and frequency domain - Power spectrum Statistical Analysis of Time Series - Some definitions
(Sec 8.1, 8.2, 8.3 & 8.4 of Text Book 1)

Text Book:

1. Stochastic Process by J.Medhi, Second Edition, Wiley Eastern Limited
2. Elements of Applied Stochastic Process by U.N.Bhatt, JohnWiley & Sons

Reference Books:

1. Stochastic Process by N.U. Prabhu, Macmillan, NewYork

PRACTICALS **(20 Marks)**

i) Lab Work (MATLAB)

(10 Marks)

1. Basic Matrix operations
2. Computation of Eigen values & Eigen vectors.
3. Computation of steady state probability distribution using
    a. Power method
    b. Jacobi method
    c. Gauss-Seidel method

Reference Books:

1. Getting Started with MATLAB by Rudra Pratap, Oxford University Press.
2. Introduction to Numerical Solutions of Markov Chains by William J. Stewart, Princeton University Press.

ii.Case Studies **(10 Marks)**

Applications of finite Markov Chains in Finance and Banking, Health Care, Retail Business, Internet Traffic Modeling and other research and development areas.

Note: For the case studies, students will be divided into batches. Each batch consists of two or three students.