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