JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

Course Structure and Syllabi for Pre Ph.D
MATHEMATICS (2017-18)

PART - I
Choose any **one** subject of the following

S. NO.	PAPER	PAPER CODE	CREDITS:
1	Topics in Analysis	17PH54101	4
2	Mathematical Methods	17PH54102	4
3	Data Structures & Algorithms	17PH54103	4

PART - II
Choose any **one** subject of the following

S. NO	PAPER	PAPER CODE	CREDITS:
1	Theory of Differential Equations	17PH54201	4
2	Discrete Mathematics and Graph Theory	17PH54202	4
3	Topics In Algebra	17PH54203	4
4	Fluid Mechanics	17PH54204	4
5	Mathematical Modeling	17PH54205	4
6	Operations Research	17PH54206	4
7	Number Theory and Cryptology	17PH54207	4
8	Topics on Differential Subordination	17PH54208	4
9	Advance Statistical Inference	17PH54209	4
10	Topics In Nature Inspired Optimization Techniques	17PH54210	4
11	Theory of Computation	17PH54211	4

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54101) TOPICS IN ANALYSIS

UNIT – I

Abstract Integration: The concept of measurability - Simple functions – Properties of measure, Integration of positive functions and complex functions – Set of measure zero.

UNIT – II

Positive Borel Measures: Vector spaces – Review of topological preliminaries leading to locally compact Hausdorff spaces – Riesz representation theorem – Regularity properties of Borel measures – Lebesgue measures – Continuity property of measureable functions.

UNIT – III

L^p-Spaces: Convex functions and inequalities – The L^p-spaces – Approximation by continuous functions.

Banach Space Techniques: Banach spaces – Consequences of Baire's theorem – Fourier coefficients of L^1 functions – Hahn Banach theorem.

UNIT - IV

Integration on product spaces: Measurability on Cartesian products – Product measure and its completion – Fubini's theorem – Convolution – Distribution functions.

UNIT – V

Harmonic Functions: Laplacian of a harmonic function – Poisson integral of L^1 function – Mean value property – Boundary behavior of Poisson Integrals – Representation theorems.
Analytic continuation: Regular and Singular Points – Continuation along curves natural boundaries – Monodromy theorem.

References:

1. Walter Rudin, Real & Complex Analysis, Tata McGraw-Hill, Third Edition (Year of publication/Reprint: 1987).
2. H.L. Royden, Real Analysis, Collier Macmillan (Year of publication/Reprint: 1988)
3. P.R.Halmos, Measure theory – Graduate Text in Mathematics, Springer Verlag, New York (Year of Publication/Reprint 1974).
4. M. Thamban Nair, Functional Analysis – Prentice Hall, India (Year of Publication/Reprint 2003).
5. E.Kreyszig, Introductory Functional Analysis with Applications, John Wiley and sons. (Year of Publication/Reprint 1989).
6. L.V. Ahlfors, Complex Analysis, Mc Graw Hill. (Year of Publication/Reprint 1988)
7. J.B.Conway, Functions of one complex Variables I, Narosa Publishing House. (Year of Publication/Reprint 2000)
8. S.Lang, Complex Analysis, Springerm Verlag (Year of Publication/Reprint 2003).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54102) MATHEMATICAL METHODS

UNIT – I

Harmonic Functions: Basic properties of harmonic functions – Harmonic functions on a disk – sub harmonic and super harmonic functions – the Dirichlet problem – Green's functions.
Entire Functions: Jonsen's Formula – The genus and order of oan entire function – Hadamard factorization theorem Steady Temperatures. Steady Temperatures in a Half Plane. A Related problem.

UNIT - II

Temperatures in a Quadrant with part of One Boundary Insulated. Electrostatic Potential. Potential in a Cylindrical space. Two-dimensional Fluid Flow. The stream Function. Flow around a Corner. Flow around a Cylinder.
Laplace Transforms – Inverse Laplace Transforms – Error functions – Application to boundary value problems (Heat equation-Laplace equation) – Fourier transform – Fourier integral formula – Finite &infinite Fourier sine and cosine transforms – Application to integral equations and Boundary Value problems.

UNIT - III

Special function: Bessel functions : recurrence relations for the Bessel co-efficients – Series expansion for Bessel co-efficients – Integral expression for the Bessel co-efficients. The additions formula for the Bessel co-efficients.
Numerical solution of partial differential equations – Introduction – Finite difference approximation to derivatives – Finite difference methods – Laplace's equation - parabolic equations – Cranice – Nicholson Method – Jacobi Method - Gauss Siedel method.

UNIT - IV

Finite Element Methods - Integral formulation and Variational Methods: Need for Weighted-Integral forms – Some mathematical concepts and formulas – Boundary, Initial and Eigen value problems – Integral relations – Functionals – The Variational Symbol – Weak formulation of Boundary Value problems – Weighted – Integral and Weak formulations – Linear and Bilinear forms and Quadratic Functional – examples. Variational methods of approximation – The Rayleigh – Ritz Method – Petrov – Galerkin method.

UNIT - V

Maxima and Minima The Simplest Case, Illustrative Examples, Natural Boundary Conditions and transition conditions, The Variational notation, The more general case, Constraints.
Lagrange Multipliers, Variable end points, Sturm-Liouville problems. integral equations: Introduction, Relations between Differential and Integral Equations, The Green's function, Alternative Definition of the Green's function, Linear Equations in Cause and Effect-The influence function.

References:

1. **Functions of one complex variable, Second edition**, John B. Conway, Springer International Student Edition. (Chapter X and XI)
2. **Integral Transforms** Goyal and Gupta
3. **Introductory Methods of Numerical Analysis** by S. S. Sastry, Printis Hall Publication.
4. **Standard and treatment "AN INTRODUCTION TO THE FINITE ELEMENT METHOD**" G.N.REDDY McGraw-Hill Inc. (Second Edition) (Chapters 1 and 2).
5. **"Methods of Applied Mathematics",** FRANCIS B. HILDEBRAND,Second Edition, PHI Ltd, New Delhi.
6. **"Special functions of Mathematical physic and Chemistry"** I.N. Sneddon, of Longman Publications. (Chapter 4)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54103) DATA STRUCTURES & ALGORITHSM

UNIT – I

Stacks & Queues: 10 periods Introduction to Data Structures, ADT Stack and its implementation in C++, Evaluation of postfix expressions, ADT Queue and its implementation in C++, Generalising a Stack and its implementation using Templates.

UNIT - II

Searching Algorithms :Sequential search & Binary search algorithms, Implementation in C++, Estimation of Time complexity in Best, Worst and average cases, Classification of algorithms, Big-OH notation.

UNIT-III

Sorting Algorithms : Methodology, Implementation and Algorithm Analysis of Insertion sort, Selection sort, Merge Sort and Quick Sort.Trees: Definition and Implementation of ADT Binary tree, AVL Trees, Heaps, Heap sort and Priority Queues.

UNIT - IV

Graphs: Definition of Graph, Representation of Graphs, Graph Traversal methods, Topological sorting, Minimum cost Spanning trees, Implementation of Kruskal's Algorithms, Finding shortest paths in a di-graph.

UNIT - V

Algorithm Design Techniques:Divide and conquer,Greedy algorithm

Text Book:

Introduction to Data Structures & Algorithms with C++, GLENN W.ROWE, Prentice Hall India,2003

References:

1. Data Structures in C++, N.S.KUTTI & P.Y.PADHYE, Prentice Hall India, 2003
2. Data Structures & Algorithms in C++, Adam Drozdek, Vikas Publishing House, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54203) THEORY OF DIFFERENTIAL EQUATIONS

UNIT – I

System of differential equations: System of first order equations – existence and uniqueness of solution – Gronwall's inequality – continuous dependence on initial conditions and parameters.

UNIT – II

Linear systems: Autonomous systems – Transition matrix – Phase- space of two dimensional systems – time varying systems – fundamental matrix and its properties – linear systems with periodic coefficients.

UNIT – III

Stability of differential systems: Stability of linear systems – almost linear systems – stability of periodic solutions – Lyapunov stability theorems for non linear system – limit cycles – Poincare – Bendixon theorem – Lienard Syatems – Construction of Lyapunov function – Bifurcations (Transcritical, Saddle-node, Pitchfork, Hopf, Sotomayor theorem)

UNIT – IV

Review of first order PDE: classification – solution method for quasi-linear and nonlinear pde – discontinuous solution – conservations laws and shocks.
Four important linear PDE's (transport, Laplace, heat and wave equations): fundamental solution – meanvalue formulae – properties of harmonic functions – Green;s function and energy method.

UNIT – V

Sobolev spaces: Definition – approximations – sobolev inequalities – extensions –traces – compactness –dual spaces.
Ellipitc Equations: Definations - Existence of Weak solutions – Regularity – Maximum principles – Eignevalues and eigen –function. Linear evolution equations : Parabolic equation – hyperbolic equations – semigroup theory.

References:

1. G.F. Simmons, Differential Equations with Applications and Historical Notes, 2nd Ed., McGraw – Hill (Year of Publication/Reprint: 1991).
2. R.P Agarwal, D.O's Regan, An Introduction to Ordinary Differential Equations, Springer ((Year of Publication/Reprint: 2008).
3. K.S Bhamra – Ordinary Differential Equations – Narosa Publications ((Year of Publication/Reprint: 2015).
4. I.N.Sneddon, Elements of Partial Differential Equations – McGraw –Hill ((Year of Publication/Reprint: 1957).
5. L.C. Evans, Partial Differential Equations, 2nd Ed., American Mathematics Society. (Year of Publication/Reprint: 2015).
6. M.Renardy, R.C Rogers, An Introduction to Partial Differential Equations, 2nd Ed., Springer (Year of Publication/Reprint: 2010).
7. S.Kesavan, Topics In Functional Analysis and its Applications, New Age International (P) Ltd. (Year of Publication/Reprint: 2012).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54202) DISCRETE MATHEMATICS AND GRAPH THEORY

UNIT-I:

Statements & Notation – Connectives - Well formed formulas – Duality law – Functionally complete sets of connectives – Normal forms and principal normal forms.
Theory of Inference for the statement calculus – Rule of inference – Automatic theorem proving – Predicate calculus.

UNIT-II:

Representation of Discrete Structures – Relations and ordering – Functions – Composition of functions and inverse functions – Recursive functions, sets and predicates.
Lattices and Boolean algebra – Lattices as a partially ordered sets – Some properties of lattices, lattices as algebraic systems – Sublattices – Direct product and Homomorphism – special Lattices – Boolean algebra – Boolean functions, - Representation and minimization of Boolean functions.

UNIT-III

Graphs – Isomorphism – Sub graphs – Euler Graphs – Hamiltonian paths and Circuits – Travelling salesman problem – Trees – Properties of trees – Spanning trees – Minimal spanning trees – Kruzkal's algorithm – Premis algorithm – Dijkstra's algorithm.

UNIT-IV

Cut-sets and cut-vertices – Planar graph duality in planner graphs – Matrix representation of graphs – incidence matrix – Adjacent matrix path matrix – Circuit matrix – Cut set matrix – Transitive closur or a graph – Warshall's algorithm.
Coloring covering and partitioning – Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Coverings the four color problem.

UNIT-V

Directed graphs – Digraphs – Types of Digraphs – Directed paths and connectedness – Euler digraphs – Trees with directed edges – Fundamental circuits in digraphs – Adjacency matrix of a digraphs – Acyclic digraphs & decyclization.

References:

1. **Discrete Mathematical structures with Applications to Computer Science**, J.P. Tremblay & R. Manohar, TATA McGraw-Hill Edition (Chapter 1.1 to 1.5, 2.2 to 2.6 and 4.1 to 4.4)
2. **Graph Theory with applications to Engineering and Computer Science**. Narsingh Deo,PHI Prentice-Hall India.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54203) TOPICS IN ALGEBRA

UNIT-I

Review of group actions and Sylow's theorems – Free groups and relations – normal series – nilpotent and solvable groups.

UNIT-II

Review of rings and ideals – PID – Euclidean domains and UFD. Modules – direct sums of modules – free modules – exact sequences – finitely generated modules over a PID – Structure of finitely generated abelian groups – rational and Jordan canonical forms.

UNIT-III

Review of algebraic extensions of fields – algebraic closure and splitting fields. Normal extensions and separable extensions – finite fields- Galois theory – The fundamental theorem of Galois Theory – roots of unity – cyclotomic extensions – cyclic extensions Galois group of a polynomial – solvable and radical extension – insolvability of the quintic.

UNIT-IV

Artinian and Noetherian modules and rings- modules of finite lengths – simple and semisimple modules and rings – Wedderburn –Artin theorem – nill radical and Jacobson radical of an Artinian ring.

UNIT-V

Commutative rings: Primary decompositions of Ideals and modules.

References:

1. I. N. Herstein University of Chicago Topics in Algebra 2nd Edition John Wiley & Son's New York , Chichester • Brisbane • Toronto • Singapore
2. Dummit D.S and Foote R.M., "Abstract Algebra" John Wiley and Sons (3rd Edition) (Year of Publication/Reprint: 2003).
3. Hungerford T.W., "Algebra", Springer. (Year of Publication/Reprint: 1980).
4. Bhattacharya P.B., Jain S.K and Nagpaul S.R., "Basic Abstract Algebra", Cambridge University Press (2nd Edition) (Year of Publication/Reprint: 1995).
5. LangS., "Algebra", Springer (3rd Edition) (Year of Publication/Reprint: 2005).
6. Jacobson N., "Basic Algebra Vol. I & Vol .II " Dover Publications (2nd Edition) (Year of Publication/Reprint: 2009).
7. Musuli C., "Introduction to Rings and Modules", Narosa Publishing House (2nd Edition) (Year of Publication/Reprint: 1997)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54204) FLUID MECHANICS

UNIT - I

Kinematics of fluids in motion: Real fluid and ideal fluids - Velocity of fluid at a point - Stream lines and path lines - Steady flow and unsteady flow, velocity potential, velocity vector ,local and partical of fluid, conditions at a rigid boundary, general analysis of fluid motion.
Equations of motion of a fluid: Pressure at a point in a fluid at rest - Pressure at a point in a moving fluid - Conditions at boundary of two inviscid in compressive fluids - Euler's equation of motion - Bernoulli's equation.

UNIT - II

Three dimensional flows: Sources – Sinks – Doublets - Images in a rigid infinite plane - Images in solid spheres - Axisymmetric flows - Stokes stream function for axisymmetrical irrotational motions.
Two dimensional flows: Meaning of two dimensional flow - Use of cylindrical polar coordinates - stream function, complex potential for two dimensional irrotational incompresive flow - Complex velocity potentials for standard two dimensional flow - Uniform stream line sources and line sinks - Line doublets line vortices.

UNIT - III

Milne Thompson circle theorem - application s of circle theorems extensions of circle theorem - theorem of blassius,
Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid element - The rate of strain quadric and principal stresses – Some further properties of the rate of strain quadric – Stress analysis in fluid motion – Relations between stress and rate of strain – The coefficient of viscosity and laminar flow.

UNIT – IV

The Navier-Stokes equations of motion of a viscous fluid – Some solvable problems in viscous flow – Steady motion between parallel planes – Steady flow through tube of uniform circular cross-section – steady flow between concentric rotating cylinders – Steady viscous flow in tubes of uniform cross-section – Tube having equilateral triangular cross-section.

UNIT – V

Diffusion of vorticity – Energy dissipation due to viscosity – steady flow past a fixed sphere – Dimensional analysis; Reynolds number Prandti's boundary layer.

References:

1. **F. Chorlton, Textbook of Fluid Dynamics**, CBS Publishers & Distributors.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54205) MATHEMATICAL MODELING

UNIT – I

Mathematical Modelling Through Systems of Ordinary Differential Equations of the First Order

Mathematical Modelling in Population Dynamics, Mathematical Modelling in Economics through Systems of Ordinary Differential Equations of First Order, Mathematical Models in Medicine, Arms Race, Battles, and International Trade in Terms of Systems of Ordinary Differential Equations, Mathematical Modelling in Dynamics Through Systems of Ordinary Differential Equations of First Order.

Mathematical Modelling Through Ordinary Differential Equations of Second Order

Mathematical Modelling of Planetary Motions, Mathematical Modelling of Circular Motion and Motion of Satellites, Mathematical Modelling through Linear Differential Equations of Second Order, Miscellaneous Mathematical Models through Ordinary Differential Equations of Second Order.

UNIT – II

Mathematical Modelling Through Difference Equations

The Need of Mathematical Modelling through Difference Equations: Some Simple Models, Basic Theory of Linear Difference Equations with Constant Coefficients, Mathematical Modelling Through Difference Equations in Economics and Finance, Mathematical Modelling Through Difference equations in Population Dynamics and Genetics, Mathematical Modelling Through Difference Equations in Probability Theory, Miscellaneous Examples of Mathematical Modelling Through Difference Equations.

UNIT – III

Mathematical Modelling Through Partial Differential Equations

Situations giving rise to Partial Differential Equations Models, Mass Balance Equations: First Method of Getting PDE Models, Momentum-Balance Equations: The Second Method of Obtaining PDE Models, Variational Principles: Third Method of Obtaining PDE Models, Probability Generating Function, Fourth Method of obtaining PDE Models, Model for Traffic flow on a Highway, Nature of Partial Differential Equations, Initial and Boundary Conditions.

UNIT – IV

Mathematical Modelling Through Graphs

Situations that can be Modelled Through Graphs, Mathematical Models in Terms of Directed Graphs, Mathematical Models in Terms of Signed Graphs, Mathematical Modelling in terms of Weighted Digraphs, Mathematical Modelling in terms of Unoriented Graphs.

UNIT – V

Mathematical Modelling Through Calculus of Variation, Dynamic Programming, Mathematical Programming, Maximum Principle and Maximum Entropy Principle

Optimization Principles and Techniques, Mathematical Modelling Through Calculus of Variation, Mathematical Modelling Through Dynamic Programming, Mathematical Modelling Through Linear Programming, Mathematical Modelling Through Non-Linear Programming, Mathematical Modelling Through Maximum Principle, Mathematical Modelling Through the use of Principle of Maximum Entropy.

References:

1. **Mathematical Modelling**, J N KAPUR, Willey Eastern Limited

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54206) OPERATIONS RESEARCH

UNIT - I

Introduction to Linear program problem method -Simplex Method-big M-method and Dual Simplex methods.

UNIT - II

Transportation problems – Assignment models and The traveling salesman (Routing) Problem.

UNIT – III

Markov Analysis: Introduction – Stochastic (Random) process – Markov process – Transition probability – Transition probability matrix – First order and higher order Markov process – n-Step transition probabilities – Markov chain – Steady state (Equilibrium) condition – Markov Analysis.

UNIT – IV

Game Theory in job sequencing Minimax (Maximin) Criterion and optimal strategy – Saddle point, optimal strategies and the value of game – Solution of games with seddle point(s) – Illustrative examples – Rectangular games without seddle point – Minimax-Maximin principle for mixed strategy games – Equivalence of Rectangular game and Linear programming – Minimax Theorem (Fundamental theorem of game theory) – solution of m x n games by linear programming – Two by-two (2 x 2) games – Principle of dominance to reduce the size of the game – Graphical method for (2 x n) and (m x 2) games – Matrix method for m x n games

Job sequencing: Introduction – Terminology and notations – Principal assumptions – Solution of sequencing problem – Processing n jobs through 2 machines – Processing n jobs through 3 machines – Processing 2 jobs through m machines – Processing n jobs through m machines.

UNIT – V

Inventory models and Queuing theory

Deterministic Elementary inventory models: Concept of average inventory – Concept of economic ordering quantity(EOQ) – the EOQ model without shortage – The EOQ model with shortages – Multi-item deterministic models (The EOQ with constraints).

Solution of queueing models and limitations for the applications – Model (M |M |1) : FCFS) : Birth and Death model – Model ii (A) General Erlang queueing model (Birth-Death process) – Model III, (M |M |1) : (N | FCFS) – Model IV (A), (M |M |s) : (∞ |FCFS) – Non-Poisson queueing model.

References:

1. **Operations Research,** S. D. Sharma, Kedar Nath Ram Nath & Co. Publishers,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54207) NUMBER THEORY AND CRYPTOLOGY

UNIT – I

Terminology – Steganography – Substitution ciphers – Transposition ciphers – enciphering of Mtrices- Simple XOR – one -Time pads. Information theory – complexity theory.

UNIT – II

Number theory (Modular Arithmetic, Chinese Remainder Theorem - Quadratic Residues) and applications – Factoring – Discrete Logarithm in a finite fields- Primality Testing.

UNIT – III

PUBLIC-KEY ALGORITHMS: Background – Knapsack Algorithm – RSA Algorithm –Rabin Algorithm – El-Gamal Public-Key Cryptosystem – Mc Elice Public-key Algorithm.

UNIT – IV

PUBLIC-KEY DIGITAL SIGNATURE ALGORITHMS: Digital Signature Algorithm (DSA) – DSA Variants – RSA signature scheme – El-Gamal signature scheme – Schnorr signature scheme.

UNIT – V

Elliptic curves - basic facts, Group structure-Elliptic curves over R, C, Q - Hasse's theorem (without proof)- Weil's conjectures (without proof)- Elliptic curve factorization - Lenstra's method. Elliptic curve cryptosystems.

References:

1. Applied Cryptography " by Bruce schneier John Wiely & Sons Publications,2e,1996.
   (Available at http://www.cse.iitk.ac.in/users/anuag/crypto.pdf)
2. **A Course in Number Theory and Cryptology**, Neal Koblitz Graduate Texts in Mathematics, Springer (1987).
3. **Rosen M. and Ireland K., A Classical Introduction to Number Theory**, Graduate Texts in Mathematics, Springer (1982).
4. **Factorization and Primality Testing, Undergraduate Texts in Mathematics**, David Bressoud: Springer (1989).
5. Cryptography: Theory and Practice, by D.R.Stinson, C.R.C Press, Boca Raton, Florida, Second Edition, 2002.
6. Introduction to Cryptography, by Johnnes Buchmann, 2e, Springer-verlag, 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54208) TOPICS ON DIFFERENTIAL SUBORDINATION

UNIT – I

Prellminaries: Subordinations, Hypergeometric functions - Classes of functions – Integral operators – Fundamental lemmas – Admissible functions and examples – Open door lemma and integral existence theorem.

UNIT – II

Applications of First order Differential Subordination: Briot –Bouquet differential subordination, Analytic integral operators – Subordination preserving integral operators.

UNIT – III

Applications of Second order Differential Subordination: Integral operators preserving functions with positive real parts Integral operators preserving bounded functions- Averaging integral operators- Hypergeometric functions – Schwarzian and Starlikeness.

UNIT – IV

Special Differential Subordination: Conditions for special subclasses of starlike functions – Simple Conditions for starlikeness and convexity – subordination by convex functions – Functions with bounded turning – starlike with respect to symmetric points.

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UNIT – V

Differential Subordination in Several Complex Variables: Preliminary lemmas- Extensions of the fundamental lemma-Dominant and admissible functions in C^n – Differential Subordination in C^n - Applications in other fields – Harmonic functions – Meromorphic functions – Differential subordination in the upper half plane –Extension to Banach spaces.

References:

1. S.SMifler and P.T. Mocanu, Differential Subordination, Theory and Applications, Marcel Dekker, New York and Basel. (Year of Publications/Reprint: 2000)
2. T. Bulboaca, Differential Subordinations and Superordinations, Recent Results, House of Scientific Book, Cluj-Napoca, (Year of Publications/Reprint: 2005)
3. Jan Graham and Gabriela kohr, Geometric function theory in one and Higher dimensions, Chapman & Hall, CRC Press London. (Year of Publications/Reprint: 2003)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54209) ADVANCE STATISTICAL INFERENCE

UNIT – I

Principle of Data Reduction: Sufficiency principle - Factorization criterion – minimal sufficiency – completeness and bounded completeness – likelihood principle – Equivariance principle.

UNIT – II

Theory of estimation: Basic concepts of estimation – Point estimation – methods of estimation- method of moments - method of maximum likelihood – Unbiasedness – Minimum variance estimation – Cramer – Rao bound and its generalization – Rao Blackwell theorem – Existence of U.M.V.U.E estimators.

UNIT – III

General decision problem: Loss function, Risk function – Non-randomized and Randomized decision rules – Admissibility – Bayes' and Minimax decision rules – Sequential decision rules.

UNIT – IV

Testing of Hypothesis: Critical region and power of the test – Neyman-Pearson lemma – Likelihood ratio principle – Uniformly most powerful tests – Unbiased test – Sequenctial probability ratio test.

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UNIT – V

Analysis of variance: one way classification and its extension – Simple linear regression analysis with normal distributon.

References:

1. Rao. C.R Linear statisica inference and its Application (Wiley Easterm Ltd) 2nd Edition (Year of Publication/Reprint: 2001)
2. Ferguson, T: Mathematical Statistics – A Decision Theoreitc Approach (wiley & Sons) (Year of Publication/Reprint: 1967)
3. Berger, J.O: Statistical Decision Theory and Bayesian Analysis (springer – Verlag) (Year of Publication/Reprint: 1985)
4. Lehman, E.L: Testing of Statistical Hypothesis , Wiley Eastern Ltd. (Year of Publication/Reprint: 1959)
5. Lehman, E.L: Point Estimation, John Wiley & Sons (Year of Publication/Reprint: 1984)
6. G.Casella, R.L Berger: Statistical Inference 2nd Edition, Duxbury Press (Year of Publication/Reprint: 2002)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54210)TOPICS IN NATURE INSPIRED OPTIMIZATION TECHNIQUES

UNIT – I

Review of Deterministic and Probailistic approaches for solving nonlinear optimization problems – The No Free Lunch Theorem.
Evolutionary Algorithms: Darwin's Theory of Evolution – Evolutionary Strategies – Evolutionary Programming – Differential Evolution – Binary and Real Coded Genetic Algorithms. Case studies.

UNIT – II

Swarm Intelligence: Particle Swarm Intelligence – Artificial Bee Colony Algorithm – Glowworm Optimization – Spider Monkey Optimization – Grey Wolf Optimization – Bat Algorithm – Case studies.

UNIT – III

Gravitational Search Algorithm – Central Force Optimization Water Drop Algorithm – Harmony Search Algorithm. Case Studies.
Methods based on rejection strategies –repair strategies – specialized operators and penalty functions for constrained optimization. Case studies.

UNIT – IV

NP Hard Problems: Traveling Salesman Problem – Time Table Problem – Vehicle Routing Problem – Maximum Clique Problem – Su-Do-Ko

UNIY – V

Multi objective Optimization: Convex and non-convex problems- dominance – Concepts and properties – Pareto – optimality – solution using Nature Inspired optimization – bi level optimization. Case studies.

References:

1. Xin-She Yang: "Nature Inspired Optimization Algorithms", Elsevier. (Year of Publication/Reprint: 2009)
2. K. Deb:"Multi-Objective Optimization using Evolutionary Algorithms", K.Deb John Wiley and Sone, New Delhi(Year of Publication/Reprint: 2002)
3. K.Deb: "Optimization for Engineering Design Algorithms and Examples", Prentice Hall of India, New Delhi. (Year of Publication/Reprint: 1998)
4. M Gen , and R. Cheng " Genetic Algorithms and Engineering Design", Willey, New York. (Year of Publication/Reprint: 1997)
5. A.P Engelbrecht: "Fundamentals of Computational Swarm Intelligence", Wiley & Sons. (Year of Publication/Reprint: 2005

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

(17PH54211) THEORY OF COMPUTATION

UNIT – I

Regular languages models: finite state machines (deterministic and non-deterministic), regular grammars, regular expressions

UNIT – II

Equivalence of deterministic and non-deterministic machines and of the three models.
Properties: closure, decidability, minimality of automata, iteration theorems.

UNIT – III

Recursive and recursively enumerable sets models: turing machines, grammars, recursive functions, their equivalence.

UNIT – IV

Church's thesis. Properties: closure, decidability, undecidablity/noncomputability, notion of reductions.

UNIT – V

Context-free languages models: grammars (including different normal forms), pushdown automata, and their equivalence. Properties: closure, iteration theorems, parsing.

References:

1. Daniel I.A.Cohen, Introduction to Computer Theory, Second edition, John Wiley,1997.

2. Harry R. Lewis, Christos H. Papadimitriou, Elements of the Theory of Computation, 2nd edition, Pearson Education, 1998.
3. John E. Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Introduction to Automat Theory, Languages and Computation, 3 rd Edition Pearson Education, 2007.