



COURSES OF STUDIES
POST GRADUATE COURSE

MATHEMATICS



Fakir Mohan Autonomous College
Balasore

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DETAILS COURSE OF MATHEMATICS (PG)

1ST SEMESTER

PAPER -I

REAL ANALYSIS - I

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Elements of Metric Spaces
- Compact Sets, Perfect Sets, Connected Sets
- Hein – Borel Theorem

UNIT-II

- Uniform Convergence
- Uniform Convergence and Continuity
- Uniform Convergence and Integration
- Uniform Convergence and Differentiation
- Equicontinuous Family of Functions
- Wierstrass Nowhere Differentiable Function
- Wierstrass Approximation Theorem.

UNIT-III

- Lindeloff Theorem, Cantorlike Sets
- Lebesgue outer Measure, Measurable Sets.
- Regularity, Measurable Function
- Borel and Lebesgue Measurability

UNIT- IV

- Integration of Non-Negative Functions
- General Integral
- Integration of Series
- Riemann & Lebesgue Integration
- Differentiation, The four derivatives
- Function of Bounded Variation
- Lebesgue Differentiation Theorem
- Differentiation and Integration

UNIT-V

- Inequalities and the L^p Spaces
- The L^p Spaces, The Convex Functions
- The Jensen's Inequality
- The Inequalities of Holder and Minkowski
- Completeness of L^p Space
- Convergence in Measure
- Almost Uniform Convergence

Books Recommended

Principles of Mathematical Analysis - W. Rudin, Mcgrawhill International Edition.

Article

2.15 - 2.43 & 2.47, 7.1 - 7.27

Measure Theory and Integration - G.De. Barra, Wiley Eastern Publication

Article

(1.6, 1.7), (2.1-2.5), (3.1-3.4) (4.1-4.6), (6.1-6.5), (7.1-7.4)

Books of reference :

- a) Mathematical Analysis - T. M. Apostol, Narosa Publication
- b) Real Analysis - H.L. Royden
- c) Measures Theory and Integration - I. K. Rana
- d) Real & Complex Analysis - W. Rudin
- e) Real Analysis N . L Carothers, Cambridge University Press

PAPER-II

COMPLEX ANALYSIS

Full Marks - 50

Time -3 hrs.

UNIT-I

- Complex Numbers ,Functions , Limit & Continuity

UNIT II

- Analytic Functions & Power Series

UNIT III

- Complex Integration , Classification of Singularities UNIT IV

Calculus of residues & evaluation of certain integrals

UNIT V

Conformal mapping & mobious transformation

Text book prescribed

Foundation of Complex Analysis by S.Ponnusamy , Narosa Publishing House

(Ch 1.1 to 2.5), (Ch 3.1 to 3.7), (Ch 4.1 to 4.10 (excluding 4.5 & 4.6), (Ch 7.1 to 7.8),

(Ch 8.1 to 9.7 (excluding 9.6)), (Ch 5.1 to 5.8)

Books for Reference

1. Complex Analysis - R.V. Churchill
2. Function of One Complex Variable - J.B. Conway
3. Complex Analysis - S. Ponnuswami
4. Complex Analysis - L.V. Ahlfors
5. Engineering Mathematics - Erwin Kreyszig

PAPER III

LINEAR ALGEBRA

Full Marks - 50

Time : 3 Hrs.

UNIT – I

Matrices, Systems of linear equations, Vector spaces

UNIT II

Linear maps & matrices & linear operators

UNIT III

Canonical forms

UNIT IV

Bilinear forms

UNIT V

Inner product spaces.

Text Book prescribed

Linear Algebra - Promod kumar Saikia, Pearson Publication

Ch 1,2,3,4,5,6,7,8

Books for Reference

1. Linear Algebra - M. Artin
2. Finite dimensional Vector Spaces . - P.R. Halmos
3. Algebra - Vimshankar Rao
4. Algebra - I N Herstein

PAPER - IV
C -PROGRAMMING & GRPHICS

Full Marks - 50

Time -3 Hrs.

UNIT-I

- An overviews of C language, History of C language, the structure of a C program, variable, constants, Data types : Char, int, float, double, void
- Variable : Integer variable, character variable, floating variable, logical variable, string variable, declaration, scope of variables, local variables and global variables.
- Type modification : Signed, unsigned, long and short, storage class specifier, auto, static, register, expression, operators and assignment statements.
- Operators : Arithmetic operators, increment & decrement operator, relation operators, logical operators, Bitwise operator, The (?) operator, comma as an operator, precedence of operators, expression, definition, type form, type conversion in assignments, variable intialisations.
- Control statement : If general forms, nested if, the if-else-if ladder. The (?) as an alternative of if, switch general form, nested switch statements

UNIT-II

- Decision making statements, for, while, do while, break, continue, exit function, goto and label declaration, console I/O, unformatted console I/O functions, getchar (), putchar (), gets (), puts (), formatted console, I/O functions, print (), scanf ().
- Arrays : Declaration, single dimensional array, two dimensional array, multidimensional arrays.

UNIT-III

- Functions : General form, declaration and prototypes, function arguments, the return statement, returning values from a function, function call, call by value, simple rules of functions, calling functions with arrays, recursion
- Structures and Unions and user defined variables
- Structures : Basic structure, declaring a structure, referencing structure elements, arrays of structures, passing structures to functions.
- Unions : Declaration, uses, enumerated data types and typedef.
- Pointers : the &, * operators, pointers expressions, pointer assignments, pointer arithmetic, pointer comparison, function call by reference, arrays of pointers.

UNIT-IV

What is Computer Graphics, Overview of Graphics Systems, Output, primitive- line , circle, ellipse, cardioid generating algorithms, two dimensional geometric transformation – translation , rotation, scaling, reflection & Shearing.

UNIT- V :

Two dimensional viewing : viewing coordinates, points, line and polygon clipping, projection., curves and surfaces, Bezier and B-spline curve drawing methods, visible surface detection methods, Depth buffer, A-buffer, Depth-Sorting, scanline algorithm.

Books Recommended

1. C-programming - E. Balaguruswamy,

Books for Reference

1. Let us C - Y. Karnitkar,
2. C programming - Gotfried, TMH Publications
3. C in Depth - Srivasrava & Srivastava , BPB Publication
4. Computer Graphics - Hearn & Baker

Ch 1 (1.1 -1.8) Ch-2 (2.1-2.7) Ch-3 (3.1- 3.9) Ch5 (5.1- 5.4) Ch-6(6.1-6.7) Ch10(10.8,10.9)

PAPER - V

C –PROGRAMMING & GRAPHICS (PRACTICAL)

Full Marks - 50

Time -6 Hrs.

Writing of well structured modular programs related to

Printf(), scanf(), getchar (), putchar(), gets(), puts(), if, if-else ladder, switch-case, looping statement-while, do-while, for, goto label statement, single & multi dimensional array, user defined functions, structure & unions, pointers.

Graphics :

Writing Programs for drawing lines circle, ellipse, cardioid & elementary curves etc.

- Record -10
- Viva-10

2ND SEMESTER

PAPER -VI

NUMERICAL ANALYSIS

Full Marks - 50

Time -3 Hrs.

UNIT-I

Numerical Integration

UNIT - II

Numerical Differentiation & Numerical Methods for ordinary differential equation

UNIT - III

Convergence & Stability in Solutions of differential equation

UNIT IV

Numerical solution of linear equations

UNIT V

Interpolation)

Text books prescribed

An introduction to Numerical Analysis by K E Atkinson, Wiley Students edition
(Ch 5.1 to 5.4), (Ch 5.7), (Ch 6.1 to 6.5), (Ch 6.8 to 6.10), (Ch 8.1 to 8.6), (Ch 3.6, 3.7, 3.8

Books Reference

Numerical Analysis

Shastri, PHI

Numerical Analysis

Kontedoor

PAPER – VII

TOPOLOGY

Full Marks - 50

Time -3 hrs.

UNIT-I

Topological Spaces & Continuous Function

- Topological Spaces
- Basis for a Topology
- The order Topology
- The Product Topology on $X \times Y$
- The Subspace Topology
- Closed Sets and Limit Points

UNIT-II

- Continuous Function
- The Product Topology

UNIT - III

Connectedness

- Connected Spaces
- Connected Sets in the Real Line

UNIT-IV Compactness

- Compact Spaces
- Compact Sets in the Real line
- Limit point compactness

UNIT- V

Countability and Separation axioms

- The Countability Axioms
- The separation Axioms
- The Uryshons Metrization Theorem

Book Recomendend

Topology by : James R. Munkress

(2.1-2.8), 3 (3.1, 3.2, 3.5, 3.6, 3.9) 4 (4.1 - 4.3)

Book Reference

Topology

- M. Dugunchi

Topology

– Nanda & Nanda, Willard

PAPER VIII

ABSTRACT ALGEBRA

Full Marks - 50

Time - 3 Hrs.

UNIT - I

- Homomorphism, Automorphism
- Cayley's Theorem, Sylow's Theorem.

UNIT-II

- Euclidean Ring, Polynomial Rings
- Polynomials over the rational field

UNIT - III

- Extension fields, transcendence of e
- Roots of polynomials

UNIT IV

- Construction with straight edge and compass
- More about roots

UNIT V

- The elements of Galois Theorem

Books Recommended

- Topics in Algebra - I.N. Herstein
Vikas Publication

Article

- Chapter - 2: (2.7 - 2.9)
- Chapter- 3: (3.8 - 3.10)
- Chapter - 5: (5.1 - 5.6)

Books for Reference

- Algebra - M. Artin
Algebra - N. Jackabson
Contemporary Abstract Algebra - J A Gallian, Narosa

PAPER IX

DIFFERENTIAL EQUATION

Full Marks - 50

Time - 3 Hrs.

UNIT- I

- Boundary - Value Problems
- Sturm Liouville System
- Eigen-values and Eigen functions
- Expansions in Eigen functions
- Green's function

UNIT II

- Power Series Solution near ordinary and regular singular point
- Application to Legendre, Bessel and Hermite differential equations with their Principal properties

UNIT - III

- Existence and Uniqueness theorems
- Equations of the form $dy/dx = f(x,y)$
- Method of successive approximation
- Lipschitz Condition
- Continuation and dependance of solutions on initial conditions
- Existence of uniqueness of solutions of systems of equations.

UNIT - IV

- Laplace Equation
- Elementary Solution
- Green's function
- Method of separation of variables

UNIT V

- Wave Equation
- Laplace Equation & Diffusion

Books Recommended

1. S.G. Deo & V. Raghendra & Laxmikantham

Chapter- 5

2. A Course on Ordinary and Partial Differential Equation - J. Sinha Roy & S. Padhy

Chapter- 5, 7, 10, 15, 16 & 17.

Books for Reference

- Elements of Partial Differential Equation - Ian Sneddon

PAPER X

DISCRETE MATHEMATICS

Full Marks - 50

Time : 3 hrs.

UNIT - I

- Partially ordered sets & Lattices

UNIT-II

- Characteristics functions of a set
- Hashing function, Lattices and Boolean Algebra .

UNIT - III

- Recursion

UNIT-IV

- Grammar and Languages
- Application of residue arithmetic to computers group codes.

UNIT - V

- Computability Theory

Books Recommended

Discrete Mathematics for computer Science and Engineering - J.P. Trembly & R. Monohar

Article

Chapter - 2 (2.3.8, 2.3.9, 2.4.5, 2.4.6,2.6) , Chapter - 3 (3.3, 3.6, 3.7), , Chapter - 4, Chapter - 6

Book Reference

Discrete Mathematics	- L. Mott
Discrete Mathematics and its Applications	- K. Rosen (TMH)
Elements of Discrete Mathematics	- C Liu (TMH)

3RD SEMESTER

PAPER -XI

FUNCTIONAL ANALYSIS

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Normed spaces (Ch 2.1 to 2.5)

UNIT II

- Linear operators (Ch 2.6 to 2.10)

UNIT III

- Fundamentals Theorem for Normed & Banach Spaces (Ch 4.1 to 4.13)

UNIT IV

- Hilbert Spaces(Ch 3.1 to 3.10)

UNIT V

- Spectral Theory (Ch 7.1 to 7.4)

Text Book Prescribed

1. Introductory Functional Analysis with Application - Kreyszig , Wiley students Edition

Books For Reference :

1. Elements of Functional Analysis - B. K. Lahiri. World Press
2. Functional Analysis - B. V. Limaye
3. Functional Analysis - S. Nanda & Choudhury

PAPER XII

GRAPH THEORY

Full Marks - 50

Time - 3 Hrs.

UNIT - I

- Graph, its applications
- Finite and infinite graphs
- Incidence and Degree
- Isolated and pendant vertex and Null Graph
- Paths and circuits
- Isomorphism, Sub graphs
- Walks and paths, circuits, connected and disconnected graph components.
- Regular graphs, Operation on graphs, Hamilton paths and circuits
- Traveling Salesman problems.

UNIT-II

Trees and Fundamental Circuits

- Trees, Pendant vertices
- Distance and centre in a tree, Rooted and Binary tree
- On counting and spanning tree
- Fundamental circuit, cutsets and cut vertices, Cut-Sets, some properties of fundamental circuits
- Connectivity and separability
- Network flows, 1- Isomorphisms, 2- Isomorphism

UNIT-III

Planar and Dual Graphs

- Combinatorial vs. Geometric graphs
- Planar graphs, Kuratowski's Two Graphs
- Direction of planarity, Geometrical Dual, Combinatorial Dual
- Directed graphs, Types of diagraphs
- Diagram and binary relations
- Directed path and connectedness
- Euler diagraph
- Tree's with Directed edges
- Diagraphs

UNIT -IV

- Matrix Representation of Graphs

UNIT V

- Coloring, Covering and Partitoining Fundamental Cicuits in Diagraph
- Tournament and Acyclic

Books Recommended :

Graph Theory

- Narasingh Deo

Articles:

Chapter : 1, 2, 3, 4, 5 (5.1, 5.7) , 7, 8 (8.1, 8.6), 9 (excluding 9.8, 9.9)

Books Reference :

Graph Theory

- F. Harary

PAPER XIII

MATHEMATICAL MODELLING

Full Marks - 50

Time -3 Hrs.

UNIT-I

Mathematical Modelling

- Need, techniques, classification and simple illustrations
- Mathematical Modelling through ordinary differential equations of first order

UNIT-II

- Mathematical Modelling through system of ordinary differential equations of first order

UNIT III

- Mathematical Modelling through system of ordinary differential equations of second order

UNIT-IV

- Mathematical Modelling through partial differential equations

UNIT V

- Mathematical Modelling through mathematical programming, maximum principle and maximum entropy principle

Books Recommended :

Mathematical Modelling

- J. N. Kapur

New Age International Pvt. Ltd.

Ch. 1 (except 1.4) 2, 3, 4, 5, 6, 10

Books Reference :

1. Mathematical Modelling technique

- Pitman

2. Mathematical Modelling

- J.G. Andrew & R. R. Mclone

Butterworth Publication

OR

FUZZY THEORY
(AN ALTERNATIVE TO MATHEMATICAL MODELLING)

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Crisp Sets and Fuzzy Sets

UNIT II

- Operation on Fuzzy Sets

UNIT-III

- Fuzzy Relations and Fuzzy Measures

UNIT-IV

- Uncertainty and Information

UNIT V

- Applications

Books Recommended :

Fuzzy Sets, Uncertainty and Information -George J. Klir, Tina A. Farger (PHI) 6th Edition-2001

Article

(1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

(3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.1, 4.2, 4.3, 4.4, 4.5)

(5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2, 6.3, 6.6)

Every student has to opt two papers from the following electives in each Semester III & Semester IV

Paper XIV & XV

Elective - I

OPTIMIZATION THEORY AND APPLICATION-I

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Review of LPP and Graphical methods in nut - shell
- Simplex method
- Duality in linear programming
- Post optimal analysis.

UNIT-II

- Integer Programming
- Goal programming

UNIT -III

- Revised simplex method

UNIT-IV

- Transportation problem

UNIT-V

- Assignment Problem

Books Recommended

1. Operation research - Kantiswaroop, P.K. Gupta and Manmohan,
9th Revised Edition
Sutan Chand Publications
Ch. :4, 5, 6, 7, 8, 9 (9.2 only), 10,

Books of Reference

1. Operation Research - H. Taha
2. Operation Research - G. J. Liberman
3. Linear Programming - Hardley

N.B. : Emphasis will be lead on methods of solutions of problems rather than proving basic theorem theory.

ELECTIVE - II

OPTIMIZATION THEORY AND APPLICATION-II

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Sequencing Problem
- Games & Strategies

UNIT-II

- Dynamic Programming

UNIT-III

- Networking Scheduling by PERT & CPM
- Resource Analysis in Network Scheduling

UNIT-IV

- Non- Linear Programming
- Methods of NLP
- Kuhn-Tucker conditions with non-negative constraints

UNIT-V

Quadratic Programming

- Wolfes' method
- Beales' method

Books Recommended

1. Operation research - Kantiswaroop, P.K. Gupta and Manmohan,
9th Revised Edition Sutan Chand Publications
Ch. :11,12,13,17,21,24(24.1-14.5), 25(25.1-25.6)

Books of Reference

1. Operation Research - H. Taha
2. Operation Research - G. J. Liberman
3. Linear Programming - Hardley

N.B. : Emphasis will be lead on methods of solutions of problems rather than proving basic theorem theory.

ELECTIVE III - FLUID DYNAMICS - I

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Basic Concept

UNIT-II

- Fundamental equations of the flow of viscous fluids.

UNIT-III

- Dynamical similarity and inspection and dimensional analysis flow between parallel plates
- Circular cylinders
- Tubes of uniform corsetsics and concentric rotating cylinders

Books Recommended :

- | | |
|---------------------------|---|
| 1. Viscous Fluid Dynamics | - J. L Bansal (Oxford and IBH Publishing Co.) |
| 2. Problem solved | - Meredith, F..W. and Griffith |
| 3. Problem solved | - Lew H.G. |

Books of Reference :

- | | |
|----------------------------------|-------------------|
| 1. Boundary Layer Theory | - H. Schlichting |
| 2. Foundation of Fluid Mechanics | - S.W. Yuan (PHI) |

ELECTIVE IV - ALGORITHMIC ANALYSIS AND DESIGN-I

Full Marks - 50

Time -3 Hrs.

UNIT I

- Foundation of ADA and Sorting
I-1, 2, 3, 4
II- 6, 7, 8, 9 (9.1 only)

UNIT II

- Data Structures
- Greedy Algorithm
III - 10, 11, 12 (excluding 12.4), 16.1, 16.2

UNIT III

- Graph Algorithms
VI- 22 (22.1, 22.5), 23.1, 23.2
24.1 - 24.5, 25.1, 25.2

Books Recommended :

- | | |
|----------------------------|------------------------------------|
| Introduction to Algorithms | - Cormen, Leiserson Rivest & Stein |
|----------------------------|------------------------------------|

ELECTIVE V - NUMBER THEORY AND CRYPTOGRAPHY-I

Full Marks - 50

Time -3 Hrs.

UNIT-I

- Unique factorization theorem
- g.c.d
- Farey sequences
- Infinitude of primes

UNIT-II

- Congruence, modular equations, Lagrange's theorem

UNIT-III

- Rational approximation of irrationals and Hurwitz's theorem
- Quadratic residues , Eulers criterion, Wilsons' Theorem

UNIT-IV

- Sum of two squares, sum of four squares theorem
- The law of quadratic reciprocity theorem & problems

UNIT-V

- Arithmetical functions and Lattice points

Books Recommended

1. Introduction to Analytical Number Theory - K. Chandrasekharan
Chapter- 1, 2, 3, 4, 5, 6,

Books References :

1. Number Theory - I.Niven, H.S.Zukerman
2. Number Theory - David Burton
3. Analytic Number Theory - Tom Apostol
4. Number Theory - Hardy & Wright

ELECTIVE VI

NUMBER THEORY AND CRYPTOGRAPHY-II

Full Marks - 50

Time -3 Hrs.

UNIT- I

- Chebyshev's theorem on the distribution of prime numbers

UNIT – II

- Minkowski's theorem on Lattice points in convex sets.

UNIT-III

- Cryptography and
- Public Key

UNIT – IV

- Elliptic curves

UNIT-V

- Primality Testing
Chapter – 7, 9

Books Recommended

1. Introduction to analytical Number Theory - by K. Chandrasekharan
Chapter - 7,9 by Springer Verlag
2. A Course in Number Theory and Cryptography -by Neal Koblitz, UTM,
Springer Verlag
Chapter - 3,4,5,6,

Books Reference :

1. Number Theory - I. Niven, H.S. Zukerman, Montgomery,
2. Number Theory - David burton
3. Analytic Number Theory - Tom Apostol
4. Analytic Number Theory - Hardy & Wright

For Cryptography.....

- Ch II Art 1 (finite field)
- Ch. III Art 1,2, (Ch. IV- 1,2,3, (Criptography and
- Ch. V. Art 1,2,3, (for primality and Factioning)

ELECTIVE VII
WAVELET ANALYSIS I

Full Marks - 50

Time -3 Hrs.

UNIT I

- A Brief Introduction to Fourier Series and Fourier Transforms

UNIT II

- Wavelet Transforms and Time -Frequency Analysis

UNIT III

- Cardinal Spline Analysis

Books Recommended :

- An Introduction to Wavelets - C.K. Chui, Academic Press
(2.1-2.5), 3 (3.1-3.6), 4 (4.1-4.6)

ELECTIVE VIII
FUNCTIONAL ANALYSIS & APPLICATIONS

Full Marks - 50

Time -3 Hrs.

UNIT – 1

Distribution (Ch 1.1 to 1.10)

UNIT II

Sobolev spaces (Ch 2.1 to 2.4)

UNIT III

Some abstract variational problems (Ch 2.5 to 3.2)

Functional analysis & applications S. Kesavan , New age international publishers

ELECTIVE IX
CALCULUS OF VARIATIONS WITH APPLICATIONS

Full Marks - 50

Time -3 Hrs.

UNIT I

Variational problems with fixed boundaries (Ch 1)

UNIT II

Variational problems with moving boundaries (Ch 2)

UNIT III

Sufficient condition for an extremum (Ch 3)

Calculus of variations with applications A.S GUPTA

ELECTIVE X
FRACTALS - I

Full Marks - 50

Time -3 Hrs.

UNIT -1

Space of fractals (Ch 2)

UNIT II

Construction of Fractals (Ch 3)

UNIT III

Fractals Dimension (Ch 5)

ELECTIVE XI
FRACTALS - II

Full Marks - 50

Time -3 Hrs.

UNIT – I

Fractal Interpolation (Ch 6)

UNIT – II

Julia Sets (Ch 7)

UNIT – Majors on Fractals

Form Fractal I & II: Text Book Prescribed

Fractals Everywhere

By M.F Barnsley , Academic Space

ELECTIVE XII
ADVANCED COMPLEX ANALYSIS

Full Marks - 50

Time -3 Hrs.

Unit – I

Maximum principle (Ch 6.1 to 6.8)

UNIT II

Analytic Continuation (Ch 10.1 to 10.5)

UNIT III

Mapping Theorems (Ch 12.1 to 12.8)

Text Books

Foundation of Complex Analysis

S. Ponnuswamy, Narosa

ELECTIVE XIII
ALGEBRAIC TOPOLOGY- I

Full Marks - 50

Time -3 Hrs.

UNIT – I

Calculus in the Plane (Ch 1 & II)

UNIT – II

Winding Numbers (Ch 3 & 4)

UNIT III

Cohomology & Homology (Ch 5 , Ch 6)

ELECTIVE XIV
ALGEBRAIC TOPOLOGY- II

Full Marks - 50

Time -3 Hrs.

UNIT – 1

Covering Spaces & Fundamentals Groups (Ch 11, 12)

UNIT II

Van kampan Theorem (Ch 14)

UNIT III

Topology of surfaces (Ch 17)

For elective XI & XII text Book Prescribed

Algebraic topology

William Fulton, Springer

ELECTIVE XV
FLUID DYNAMICS – II

Full Marks - 50

Time -3 Hrs.

UNIT- I

- Stagnation point flows, flow due to rotating disks
- Suddenly accelerated plates

UNIT- II

- Oscillating plane wall
- Starting flow in a plane and pipe
- Plane couette flow with transpiration cooling

UNIT- III

- Flow past porous flat pate
- Flow past aporous circular cylinder
- Theory of laminar boundary layers
- Integral methods for the approximate solution of laminar boundary layer equations.

Books Recommended :

1. Viscous Fluid Dynamics - J.L. Bansal (Oxford and IBH Publishing Co.)
2. A.A. : Problem solved - Meredith, F.W. and Griffith
A.A.R.C. 2315, 1955, R.A.E. Report No.
3. Problem solved - Lew H.G.

Books of Reference :

1. Boundary Layer Theory - H. Schlichting
2. Foundation of Fluid Mechanics - S.W. Yuan, Printice Hall

ELECTIVE XVI

ALGORITHMIC ANALYSIS & DESIGN – II

Full Marks - 50

Time -3 Hrs.

UNIT- I

- Matrix Operations
- Polynomial

UNIT - II

- Number Theoretic Algorithm

UNIT – III

- Striking Matching and N.P., Completeness

Books recommended :

Introduction to Algorithms

- I. H. Covmen, C.E. Leiserson, R.L. Riverst
& C. Stein (PHI) Publication

Chapters:

28 (.1, .2, .3, .4, .5), 30 (.1, .2, .3)

31 (.1, .2, .3, .4, .5, .6, .7, .8, .9)

32(.1, .2, .3), 34 (.1, .2, .3, .4, .5)

4TH SEMESTER

PAPER-XVI

MATHEMATICAL STATISTICS

Full Mark : 50

Time: 3 Hrs.

UNIT - I

- Some special distributions (Binomial, Trinomial, Multinomial, Poission, Gramma, Chi-Square, Normal, Bivariate Normal)

UNIT – II

- Distributions of Functions of random variable

UNIT III

- Limiting Distributions

UNIT – IV

- Estimation (point estimation....)

Book Recommended

1. Introduction to Mathematical Statistics - R.V. Hogg, A.T.Craig
McMillan Publication

Ch. : 3, 4, (Ex. 4.6), 5 (Ex. 5.5), 6

PAPER-XVII & XVIII are to be opted out of the electives given in semester III, but the continuation must be maintained! e.g If a student is opting Optimization Theory & Application – I in Semester III only he can opt for Optimization Theory & Application – II in Semester IV

PAPER-XIX

Full Mark : 50

Project Work & Dissertation

PAPER-XX

Full Mark : 50

Project presentation & viva voce