E-mail : josecol27998@gmail.com
Website: www.sjctnc.edu.in

1.1.2: The programmes offered by the institution focus on employability / entrepreneurship / skill development and their course syllabi are adequately revised to incorporate contemporary requirements

SYLLABUS OF THE COURSES FOCUSING EMPLOYABILITY / ENTREPRENEURSHIP / SKILL DEVELOPMENT

Colour Coding

EMPLOYABILITY

ENTREPRENEURSHIP

SKILL DEVELOPMENT

M.Sc. MATHEMATICS

I – M.Sc (Maths)	ALGEBRA-I For the students admitted from the year 2011	PMT701
SEMESTER – I		HRS/WK – 6
CORE – I		CREDIT – 5

OBJECTIVES

To introduce the concepts and to develop working knowledge on class equation, solvability of groups, finite abelian groups, linear transformations, real quadratic forms.

COURSE OUTCOMES:

To help the students to learn the higher level on Algebra

CO1: Studying more on groups about Another Counting Principle

CO2: Studying about Sylow's proofs on index of subgroups

CO3: Learning about Direct products and Modules of groups

CO4: Reading the canonical forms and Jordan forms of Matrices

CO5: Studying on Rational canonical form of Trace and Transpose of Matrices

SEMESTER 1	COURSE CODE: PMT701					COURSE TITLE: ALGEBRA – I									HOURS: 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	4	3	4	3	2	5	4	3	4	3	3	2	4	4	3.4
CO2	3	4	3	3	2	2	5	3	2	3	3	5	3	3	4	3.2
CO3	4	3	2	3	2	3	4	5	2	4	4	5	3	2	3	3.2
CO4	3	4	2	2	3	3	5	3	2	3	2	4	3	3	4	3.0
CO5	4	5	3	2	2	3	5	4	3	3	4	5	3	3	3	3.4
Mean Overall Score																3.2

Result: The Score of this Course is 3.2 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT-I

Another counting principle-conjugacy- conjugacy is an equivalence relation-normalizer-normalizer is a subgroup-centre of G-theorems, problems and examples.

UNIT-II

Sylow's Theorem-definition of Sylow's theorems-first part of Sylow's theorem-second part of Sylow's theorem-third part of Sylow's theorem-conjugacy between two subgroups of G-problems and examples.

UNIT-III

Direct Products-internal direct product-external direct product- Finite Abelian groups-invariants of G-normal in G- Modules-left R-module-right R-module-submodule-cyclic submodule-finitely generated R- problems and examples.

UNIT-IV

Canonical Forms-similar matrices- invariant under T-Triangular forms-nilpotent—index of T-cyclic with respect to T-dimension of M- A Decomposition of - Jordan form-Jordan block-theorems and examples.

UNIT-V

Rational Canonical Form-comparison matrix-elementary divisors-characteristic polynomial-Trace and Transpose- Trace and Transpose-trace of T-matrix of T-transpose of a matrix-symmetric matrix-skew symmetric matrix-adjoint of a matrix- Determinant of a matrix-Cramer's rule-secular equation of A-examples and problems.

TEXT BOOK:

1. I.N. Herstein. Topics in Algebra [II Edition] Wiley Eastern Limited; New Delhi; 1975.

Unit 1 -Chapter 2: Sections 2.11 [Omit Lemma 2.1,2.5]
Unit 2-Chapter 2:12
Unit 3- Chapters: 2.13, 2.14, 4.5
Unit 4 -Chapters: 6.4,6.5,6.6
Unit 5 -Chapter: 6.7, 6.8

REFERENCE BOOKS:

1. Martin, Algebra, Prentice Hall of India, 1991.
2. P.B. Bhattacharya, S.K. Jain, and S.R. NagpauI, Basic Abstract Algebra [II Edition] Cambridge University Press, 1997. [Indian Edition]
3. I. Sluther and I.B.S. Passi, Algebra, Vol. 1 -Groups [1996]; Vol. II Rings, Narosa Publishing House, New Delhi, 1999
4. D.S. MaIik7 J.N. Mordeson and M.K. Sen, Fundamental of Abstract Algebra, McGraw Hill. [International Edition], New York. 3997
5. Jacobson, Basic Algebra, Vol. I & II W.H. Freeman; also published by Hindustan Publishing Company, New Delhi, 1980

I – M.Sc. (Maths)	REAL ANALYSIS For the students admitted from the year 2011	PMT702S
SEMESTER – I		HRS/WK – 6
CORE – II		CREDIT – 5

OBJECTIVES:

To work comfortably with functions of bounded variation, Riemann -Stieltjes Integration, convergence of infinite series, infinite product and uniform convergence and its interplay between various limiting operations.

COURSE OUTCOMES:

At the end of the Course the students should be able to exhibit

CO1: Learning the functions of bounded variations in real analysis

CO2: Getting the knowledge about basics and properties of Reimann- Steiljes Integral

CO3: Knowing more properties of Reimann- Steiljes Integral

CO4: Receiving more information about infinite series

CO5: Acquiring more knowledge of sequences of functions

SEMESTER I	COURSE CODE: PMT702S					COURSE TITLE: REAL ANALYSIS									HOURS 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES (PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	4	3	4	3	5	3	4	2	3	4	3	1	1	5	3.1
CO2	3	4	3	3	2	4	2	3	1	3	4	3	2	2	5	2.9
CO3	4	3	2	3	2	4	4	4	3	3	4	2	2	3	4	3.2
CO4	3	4	2	2	3	4	2	3	3	2	4	2	2	3	5	3.1
CO5	4	5	3	2	2	4	1	4	2	2	4	3	3	3	5	3.1
Mean Overall Score																3.1

Result: The Score of this Course is 3.1 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT-I : FUNCTIONS OF BOUNDED VARIATION:

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

UNIT-II: THE RIEMANN - STIELTJES INTEGRAL:

Introduction - Notation - The definition of the Riemann - Stieltjes integral -Linear Properties - Integration by parts- Change of variable in a Riemann -Stietjes integral - Reduction to a Riemann Integral - Euler's summation formula - Monotonically increasing integrators, Upper and lower integrals -Additive and linearity properties of upper and lower integrals - Riemann's condition - Comparison theorems.

UNIT-III: THE RIEMANN-STIELTJES INTEGRAL:

Integrators of bounded variation-Sufficient conditions for the existence of Riemann-Stieltjes Integrals-Necessary conditions for the existence of Riemann-Stieitjes integrals- Mean value theorems for Riemann - Stieltjes integrals - The integrals as a function of the interval - Second fundamental theorem of integral calculus-Change of variable in a Riemann Integral-Second Mean Value Theorem for Riemann integral

UNIT -IV: INFINITE SERIES :

Infinite Series: Absolute and conditional convergence - Dirichlet's test and Abel's test - Rearrangement of series - Riemann's theorem on conditionally convergent series.

Double sequences - Double' series - Rearrangement theorem for double series - A sufficient condition for equality of iterated series - Multiplication of series - Cesaro summability.

UNIT-V: SEQUENCES OF FUNCTIONS:

Point-wise convergence of sequences of functions - Examples of sequences of real - valued functions - Definition of uniform convergence - Uniform convergence and continuity - The Cauchy condition for uniform convergence - Uniform convergence of infinite series of functions -Uniform convergence and Riemann - Stieltjes integration - Non-uniform Convergence and Term-by-term Integration - Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series -Mean convergence.

TEXT BOOK

Tom M. ApostoI: Mathematical Analysis, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974.

Unit 1 - Chapter - 6: Sections 6.1 to 6.8
Unit 2 - Chapter - 7; Sections 7.1 to 7.14
Unit 3 - Chapter - 7: 7.15 to 7.22
Unit 4 - Chapter - 8 Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26
Unit 5- Chapter - 9 Sec 9.1 to 96, 9.8,99, 910,911, 9.13

REFERENCE BOOKS

1.Bartle, R.G. Real Analysis, John Wiley and Sons Inc./1976.
2.Rudin, W, Principles of Mathematical Analysis, 3rd Edition. McGraw Hill Company, New York, 1976.

I – M.Sc (Maths)	ORDINARY DIFFERENTIAL EQUATIONS	PMT703
SEMESTER – I	For the students admitted from the year 2009	HRS/WK – 6
CORE – III		CREDIT –4

OBJECTIVES:

To develop strong background on finding solutions to linear differential equations with constant and variable coefficients and to study existence and uniqueness of the solutions of first order differential equations.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: knowing the basic concepts Linearly Independent and dependent functions for solving differential equations.

CO2: Knowing methods to solve the differential equations and check the linear solutions.

CO3: Knowing some new techniques to convert differential equations for matrix form to find matrix solution.

CO4: Knowing some matrix methods to solve the linear differential equations.

CO5: Knowing the application of Real Analysis for solving the differential equations with analysis of unique solutions.

SEMESTER I	COURSE CODE: PMT703					COURSE TITLE: ORDINARY DIFFERENTIAL EQUATIONS									HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	2	3	3	4	4	4	2	3	3	2	4	4	5	5	4	3.5
CO2	3	4	3	4	4	5	3	3	3	3	4	5	5	4	4	3.8
CO3	4	5	4	4	5	4	3	4	3	5	5	4	4	5	4	4.2
CO4	3	4	4	3	4	4	4	4	4	4	5	4	5	4	4	4.0
CO5	4	5	5	5	5	4	4	5	4	4	5	4	5	4	4	4.5
Mean Overall Score																4.0

Result: The Score of this Course is 4.0 (High)

Association	10%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER:
Linear independence-Equations with constant coefficients-Equations with variable coefficients.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER:
Wronskian-Method of variation of parameters- Method of Laplace Transforms.

UNIT-III: **SYSTEM OF LINEAR DIFFERENTIAL EQUATIONS:**
System of first order equations-existence and uniqueness theorem- Fundamental matrix.

UNIT-IV: SYSTEM OF LINEAR DIFFERENTIAL EQUATIONS:
Non-Homogeneous Linear Systems-Linear systems with constant coefficients.

UNIT-V: **EXISTENCE AND UNIQUENESS OF SOLUTIONS:**
Lipschit condition and Gronwall Inequality-Successive approximations-Picard's Theorem-Fixed point Method.

TEXT BOOK:
1. "Ordinary Differential Equation" by S.G. Deo, V. Lakshmikantham and V. Raghavendra. Tata McGraw Hill, Second Edition Publishing Company limited.

Unit 1- Chapter-2 [section -2.4,2.5,2.6]
Unit 2 - Chapter-2 [section -2.7,2.8,2.10]
Unit 3- Chapter-4 [section -4.2, 4.4,4.5]
Unit 4- Chapter-4 [section-t4.6, 4.7]
Unit 5- Chapter-5 [section-5.2, 5.3,5.4,5.9]

REFERENCE BOOKS:
1. Ordinary Differential Equation by D. Somasundaram, Narosa Publishing House
2. Advanced Differential Equations by M.D. Raisinghania, S. Chand & Company Ltd.
3. A course in Ordinary Differential Equations by B. Rai, D.P. Choudhury and H.I. Freedman, Narosa Publishing House, New Delhi, 2002.
4. Differential Equations with applications and Historical notes by George F. Simmons, Tata McGraw Hill, New Delhi,1974.
5. Ordinary Differential Equations by W.T. Reid, John Wiley and Sons, New York, 1971

I – M.Sc. (Maths)	CLASSICAL MECHANICS	PMT704S
SEMESTER – I	For the students admitted from the year	HRS/WK – 6
CORE –IV	2011	CREDIT –4

OBJECTIVES

To study mechanical systems under generalized coordinate systems, virtual work, energy and momentum, to study mechanics developed by Newton, Langrage, Hamilton Jacobi and Theory of Relativity due to Einstein.

COURSE OUTCOMES

At the end of the course students will be able to

CO1: Use knowledge of mechanical system in classical mechanics.

CO2: Understand formulate physical problems as classical mechanics using Lagrange's equation.

CO3: Interpret solutions in physical context, Hamiltonian equations, variational principle.

CO4: Classify classical mechanics, apply Hamiltonian Jacobians, descriptions.

CO5: Formulate, understand analogies between canonical transformation.

SEMESTER I	COURSE CODE: PMT704S					COURSE TITLE: CLASSICAL MECHANICS									HOURS: 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	4	3	4	3	2	5	4	3	4	3	4	2	2	4	3.4
CO2	3	4	3	3	2	2	5	3	2	3	3	4	2	3	4	3.1
CO3	4	3	2	3	2	3	4	5	2	4	4	5	3	2	3	3.3
CO4	3	4	2	2	3	2	5	3	2	3	2	4	2	3	2	2.8
CO5	4	5	3	2	2	3	5	3	3	3	4	5	2	3	3	3.5
Mean Overall Score																3.2

Result: The Score of this Course is 3.2 (High)

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Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes

UNIT-I: MECHANICAL SYSTEMS
The Mechanical system - Generalized coordinates - Constraints - Virtual work - Energy and Momentum

UNIT-II: LAGRANGE'S EQUATIONS
Derivation of Lagrange's equations- Examples - Integrals of motion.

UN1T-III; HAMILTON'S EQUATIONS
Hamilton's Principle - Hamilton's Equation - Other variational principle.

UNIT-IV: HAMILTON-JACOBI THEORY
Hamilton Principle function - Hamilton-Jacobi Equation – Separability

UNIT-V: CANONICAL TRANSFORMATION
Differential forms and generating functions - Special Transformations -Lagrange and Poisson brackets.

TEXT BOOK
1.D. Greenwood, Classical Dynamics, Prentice Hall of India, New Delhi, 1985.

Unit 1 - Chapter 1: Sections 1.1 to 1.5
Unit 2 - Chapter 2: Sections 21 to 23[Omit Section 24]
Unit 3 - Chapter 4: Sections 4.1 to 43[Omit section 4.4]
Unit 4 - Chapter 5: Sections 51 to 5.3
Unit 5 - Chapter 6: Sections 6.1, 6.2 and 63 [omit sections 6.4, 6.5 and 6.6]

REFERENCE BOOKS

1.H. Goldstein, Classical Mechanics, [2nd Edition] Narosa Publishing House; New Delhi.

2.N.C. Rane and P.S.C. Joag, Classical Mechanics, Tata McGraw Hill, 1991.

3. J.L. Synge and B.A. Griffth, Principies of Mechanics [3rd Edition] McGraw Hill Book Co., New York, 1970.

I – M.Sc (Maths)	MATHEMATICAL PROGRAMMING	EPMT705T
SEMESTER – I	For the students admitted from the year 2014	HRS/WK – 6
ELECTIVE – I		CREDIT – 4

OBJECTIVES

This course introduces advanced topics in Linear and non-linear Programming.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Identify the significance to use ILP.

CO2: Know the different between LPP and DPP approaches.

CO3: Able to use some of the NLP technique.

CO4: Learn to solve general LPP in an essential computation procedure.

CO5: Solving LPP using revised simplex method

SEMESTER: I	COURSE CODE: EPMT705T					COURSE TITLE: MATHEMATICAL PROGRAMMING										HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	4	5	3	4	4	5	5	4	4	4	4	3	4	5	4	4.1	
CO2	4	5	3	4	3	4	4	3	5	4	3	4	5	3	5	3.9	
CO3	4	4	3	3	3	3	5	3	4	5	3	3	4	4	4	3.7	
CO4	4	5	3	4	3	5	4	3	4	4	3	3	5	3	4	3.8	
CO5	4	4	3	4	3	3	5	4	4	5	4	4	4	4	5	4.0	
Mean Overall Score																3.9	

Result: The Score of this Course is 3.9 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: INTEGER LINEAR PROGRAMMING:
Types of Integer Linear Programming Problems - Concept of Cutting Plane -Gomory's AN Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method. - Zero-One Integer Programming.

UNIT-II: CLASSICAL OPTIMIZATION METHODS:
Dynamic Programming: Characteristics of Dynamic Programming Problem -Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

UNIT-III: NON-LINEAR PROGRAMMING METHODS:
Examples of NLPP - General NLPP -Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods - Beale's Method.

UNIT-IV: THEORY OF SIMPLEX METHOD
Canonical and Standard form of LP - Slack and Surplus Variables -Reduction of any Feasible solution to a Basic Feasible solution - Alternative Optimal solution - Unbounded solution - Optimaiity conditions - Some complications and their resolutions - Degeneracy and its resolution.

UNIT-V: REVISED SIMPLEX METHOD
Standard forms for Revised simplex Method - Computational procedure for Standard form I - comparison of simplex method and Revised simplex Method.

TEXT BOOK:

1. J.K.Sharma, Operations Research , Macmillan [India] New Delhi 2001

Unit 1 – chapter 7 - Sec:7.1 to 7.7
Unit 2 – chapter 22- Sec: 22.1 to 22.5
Unit 3 - chapter 24 Sec: 24.1 to 24.4
Unit 4- chapter 25 Sec: 25.1 to 25.8
Unit 5 – chapter 26 Sec: 26.1 to 26.4

REFERENCE BOOKS:

1.Hamdy A. Taha, Operations Research, [seventh edition] Prentice - Hall of India Private Limited, New Delhi, 1997.

2. F.S. Hillier & J. Lieberman Introduction to Operation Research [7th Edition] Tata-McGraw Hill company, New Delhi, 2001.

3. Beightler. C, D. Phillips, B. Wilde foundations of Optimization [2nd Edition] Prentice Hall Pvt Ltd., New York, 1979

4. S.S. Rao - Optimization Theory and Applications, Wiley Eastern Ltd. New Delhi. 1990

I – M.Sc (Maths)	APPLIED ABSTRACT ALGEBRA For the students admitted from the year 2017	EPMT705B
SEMESTER – I		HRS/WK – 6
ELECTIVE-I (OPTIONAL)		CREDIT –4

OBJECTIVES:

The course aims to introduce the concepts of Lattices, Applications of lattices, Finite fields, Polynomials and Coding theory.

COURSE OUTCOMES:

This paper will help the students to learn the Applications of Algebra

CO1: Applications of Algebra in regarding with Lattices and its properties

CO2: Studying about Applications of Lattices like switching circuits

CO3: Getting the Knowledge about fields and polynomials

CO4: Studying more about polynomials like reducible and irreducible polynomials to find roots

CO5: Getting the Knowledge about coding theory for Linear Codes and Cyclic codes

SEMESTER I	COURSE CODE: EPMT705B					COURSE TITLE: APPLIED ABSTRACT ALGEBRA									HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES (PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	4	3	4	3	4	4	3	3	4	3	4	3	2	5	3.5
CO2	3	4	3	3	2	3	5	2	3	3	3	4	3	4	4	3.2
CO3	4	3	2	3	2	3	3	4	4	4	4	5	3	2	3	3.2
CO4	3	4	2	2	3	2	3	5	3	3	4	4	3	4	3	3.2
CO5	4	5	3	2	2	4	5	4	3	3	4	5	3	3	3	3.5
						Mean Overall Score										3.43

Result: The Score of this Course is 3.43 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT-I: LATTICES

Properties of lattices: Lattice definitions- distributive lattice
Boolean Algebras: Basic properties-Boolean polynomials, ideals, minimal forms of Boolean polynomials.

UNIT-II: APPLICATIONS OF LATTICES

Switching circuits, Basic definitions, applications

UNIT-III: FINITE FIELDS

Finite Fields and Polynomials - Finite Fields

UNIT-IV: POLYNOMIALS:

Irreducible polynomial over finite fields.

UNIT-V: CODING THEORY:

Linear codes- Cyclic codes

TEXT BOOK:

1. Applied Abstract Algebra-by Rudolf Lidl and Guntur Pilz, Springer- Verlag New York 1998.

Unit 1 Chapter 1: sec 1 to 6

Unit 2 Chapter 2: sec7 to 9

Unit 3 Chapter 3: sec13 Only

Unit 4 Chapter 3: sec 14 Only

Unit 5 Chapter 4: sec 17,18

REFERENCE BOOKS:

1. Modern Applied Algebra, by- Garrett Birkhoff & Thomas C. Bartee, CBS PUBLISHERS & DISTRIBUTORS
2. I.N. Herstein. Topics in *Algebra* [II Edition] John Wiley & Sons Publications 2002.John
3. John B. Fraleigh, A first Course in Abstract Algebra, Norosa Publication Home, New Delhi, 1996.

I – M.Sc (Maths)	ALGEBRA –II	PMT806S
SEMESTER – II	For the students admitted from the year 2011	HRS/WK – 6
CORE – V		CREDIT – 5

OBJECTIVES

To study field extension; roots of polynomials, Galois Theory, finite fields, division rings, solvability by radicals and to develop computational skill in abstract algebra.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Acquiring the knowledge on Extension fields

CO2: Learning the methods to find the roots of polynomials theoretically

CO3: Learning more about roots and Galois's theory

CO4: Receiving the knowledge about solvability of groups

CO5: Getting the knowledge on Division Algebra and Four-Square theorem

SEMESTER II	COURSE CODE: PMT806S					COURSE TITLE: ALGEBRA II										HOURS 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	4	4	3	4	3	2	5	4	3	4	3	4	2	2	4	3.4	
CO2	3	4	3	3	2	2	5	3	2	3	3	4	2	3	4	3.1	
CO3	4	3	2	3	2	3	4	5	2	4	4	5	3	2	3	3.3	
CO4	3	4	2	2	3	2	5	3	3	3	2	4	3	3	2	3.0	
CO5	4	5	3	2	2	3	5	3	3	3	4	5	2	3	3	3.5	
Mean Overall Score																3.36	

Result: The Score of this Course is 3.36 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT-I

Extension fields –dimension of K-algebraic element-algebraic of degree n-finite extension, algebraic extension and algebraic number-transcendence of e-problems and examples.

UNIT-II

Roots of Polynomials –root of p(x)-root of multiplicity-splitting field Reminder theorem, Factor theorem and isomorphism between F[x] and F'[t])-theorems and problems.

UNIT-III

More about roots-derivative of f(x)-simple extension-Elements of Galois theory-fixed field-automorphism of K-group of automorphism of K-Galois group-normal extension-theorems and examples.

UNIT-IV

Solvability by radicals –solvable-S_n is not solvable-division ring-n^{th} root of unity-Wedderburn's theorem on finite division rings-Jacobson theorem-theorems and problems.

UNIT-V

Integral Quaternions-division algebra-Frobenius theorem-adjoint of x-norm of x, N(x)-N(xy)=N(x)N(y)-Lagrange Identity-Left division Algorithm-Four - Square theorem-theorems and examples.

TEXT BOOK

1. I.N. Herstein. Topics in Algebra [II Edition] Wiley Eastern Limited, New Delhi, 1975.

Unit 1: Chapter 5: Section 5.1

Unit 2: Chapter 5: Sections 5.3

Unit 3: Chapter 5: Section 5.5 and 5.6.[Omit theorem5.6.3]

Unit 4: Chapter 5 -Section 5.7 [omit Lemma 5.7.1, Lemma 5.7.2 and Theorem 5.7.1]

Chapter 7: Sections 7.2 [Only Theorem 7.2.1]

Unit 5: Chapter 7: Section 7.3 (omit theorem 7.3.1) [Lemma 7.4.1, 7.4.2&7.4.5 only].

REFERENCE BOOKS:

1. Martin, Aigebra, Prentice Hall of India, 1991.
2. B. Bhattacharya, S.K Jain, and S.R. NagpauI, Basic Abstract Algebra [11 Edition] Cambridge University Press, 1997. [Indian Edition]
3. I.S. Luther and LB.S. Passi, Algebra, Vol. 1 - Groups [1996]; Vol. II Rings, Narosa Publishing House, New Delhi, 1999
4. D.S. Malik, J.N. Mordeson and M.K. Sen, Fundamental of Abstract Algebra McGraw Hill [International Edition], New York. 1997.
5. N. Jacobson, Basic Algebra, Vol. 1 SE II Hindustan Publishing Company, New Delhi.

I – M.Sc. (Maths)	MEASURE THEORY	PMT807
SEMESTER – II	For the students admitted from the year 2008	HRS/WK – 6
CORE – VI		CREDIT – 5

Objectives:
To generalize the concept of integration using measures and to develop the concept of analysis in abstract situations.

Course Outcomes:
At the end of the Course the students should be able to exhibit
CO1: Learning the basics of Lebesgue Measure
CO2: Getting the more knowledge about Lebesgue Measure
CO3: Knowing more properties of Measurable set
CO4: Receiving the information about General measure
CO5: Acquiring more knowledge of Measure and outer measure

SEMESTER II	COURSE CODE: PMT807					COURSE TITLE: MEASURE THEORY										HOURS 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	4	4	3	4	3	5	4	1	5	4	4	3	5	4	2	3.7	
CO2	3	4	3	3	2	5	5	2	3	3	3	2	5	4	2	3.4	
CO3	4	3	2	3	2	5	2	3	2	2	3	5	5	3	1	3.1	
CO4	3	4	2	2	3	2	4	4	4	5	2	1	4	3	1	3.0	
CO5	4	5	3	2	2	5	1	5	4	5	1	2	4	4	1	3.2	
						Mean Overall Score										3.3	

Result: The Score of this Course is 3.3 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT I: LEBESGUE MEASURE

Outermeasure–Definition&properties–Lebesguemeasure-measurablesets-properties-non-measurable-set-measurable functions-little wood's three principle.

UNIT II: LEBESGUE INTEGRAL

Lebesgue Integral of simple function bounded measurable function –of a nonnegative function- Fatou's lemma-monotone convergence theorem-General Lebesgue integral – Lebesgue convergence in measure.

UNIT III: DIFFERENTIATION AND INTEGRATION

Differentiation of monotone functions Vitali's Lemma-Integral of derivative-Functions of bounded variation Differentiation of an integral –absolute continuity –convex functions-Jensen's inequality.

UNIT IV: GENERAL MEASURE AND INTEGRATION

Measure spaces –Measurable functions –Integration-Signed measure –Hahn decomposition theorem.

UNIT V: MEASURE AND OUTER MEASURE

Outer measure Measurability –extension theorem-product measures Fubini's theorem-Tonnelli's theorem.

TEXT BOOK

1. Real Analysis –H.L. Royden –Prentice Hall of India 2001 edition.

Unit 1- chapter 3 sec.1 to 6

Unit 2 – chapter 4 sec 1 to 5

Unit 3 -chapter 5 sec 1 to 5

Unit 4 -chapter 11 sec 1, 2, 3, & 5.

Unit 5 -chapter 12 sec 1,2 and 4

REFERENCE BOOKS

1. De Barra. G. Measure and Integration –Wiley Eastern Limited 1991 edition

2. Walter Rudin-Real and Complex analysis.

I – M.Sc (Maths)	NUMERICAL ANALYSIS	PMT808S
SEMESTER – II	For the students admitted from the year 2018	HRS/WK – 6
CORE – VII		CREDIT – 4

OBJECTIVES

This course introduces a numerical method for hands-on experience on computers.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: Knowing the methods to find roots of non-linear equation.

CO2: Knowing the Numerical value of Integration by comparing the Analytical solution.

CO3: Knowing the intermediate values using cubic spline.

CO4: Knowing the methods of cubic spline to solve the differential equations.

CO5: Knowing the numerical solution of partial differential equations.

SEMESTER II	COURSE CODE: PMT808S					COURSE TITLE: NUMERICAL ANALYSIS									HOURS: 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	4	4	4	2	4	3	3	3	3	4	4	4	3	4	3.5
CO2	4	4	3	3	4	5	4	3	3	3	4	5	5	4	4	3.9
CO3	5	5	3	4	3	3	4	3	4	5	4	4	4	2	4	3.8
CO4	3	4	4	3	4	3	5	4	2	4	4	3	4	4	4	3.7
CO5	3	4	3	4	3	4	4	3	4	4	5	4	3	3	3	3.6
Mean Overall Score																3.7

Result: The Score of this Course is 3.7 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT –I

Nonlinear equation: Fixed –point iteration method and its convergence- Bisection method-regular – Falsi method – secant method – convergence of secant/Regular-Falsi method – Newton- Raphson method and its convergence- convergence when roots are repeated.

UNIT-II

Numerical integration: Newton – Cotes Formulae, Eulers- Maclaurin formula –Romberg integration- Gaussian quadrature

UNIT-III:

Splines and their applications: A piece – wise polynomial – spline approximation – uniqueness of cubic spline – construction of cubic spline.

UNIT-IV:

Minimal property of splines –Application to differential equation – Cubic spline parametric form – Chebyshev approximation by principles of least squares.

UNIT-V:

Partial differential equation: Some standard forms – Boundary conditions – Finite difference approximations for derivatives – Methods for solving parabolic equation – Explicit method – fully implicit scheme – Crank – Nicolson's (C-N) scheme – derivative boundary.

TEXT BOOK:

1. Elements of Numerical Analysis by Radhey S. Gupta Macmillan India Ltd.

REFERENCE BOOKS:

1. Elementary Numerical Analysis by Samuel D. Conte and Carl de Boor, McGraw Hill.1981
2. Introductory Methods of Numerical Methods by S. S. Sastry, Prentice – Hall India, 1994.

II – M.Sc. (Maths)		PMT809T
SEMESTER – II	FLUID DYNAMICS	HRS/WK – 6
CORE – VIII	For the students admitted from the year 2012	CREDIT –4

OBJECTIVES:

This course aims to discuss kinematics of fluids in motion, Equations of motion of a fluid, three dimensional flows, two dimensional flows and viscous flows.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: Understand the Concepts of flow in Fluid

CO2: Measure Fluid Pressure and related to flow velocity, understanding Bernouli's equations

CO3: Understand the concept of some Three-Dimensional Flow, like source, sink.

CO4: Understand and analysis the Concepts of Two Dimensional in Complex Fluid

CO5: Understand concepts of Stress in flow of Fluid, Navier Stokes Equation.

SEMESTER II	COURSE CODE PMT809T					COURSE TITLE: FLUID DYNAMICS									HOURS 6	CREDITS 4
COURSE OUTCOME	PROGRAM OUTCOME (PO)					PROGRAM SPECIFIC OUTCOME(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO2	PSO4	PSO5	PSo6	PSO7	PSO8	PSO9	PSO10	
CO1	5	5	4	5	3	3	5	5	3	5	3	5	2	5	4	4.1
CO2	5	4	3	5	2	3	5	5	3	5	2	5	2	5	3	3.8
CO3	5	4	5	5	3	3	4	5	3	5	2	4	2	5	5	4.0
CO4	5	4	4	3	2	2	3	5	2	5	2	5	2	5	4	3.5
CO5	5	3	4	5	2	3	5	5	3	5	3	4	2	5	3	3.8
Mean Overall Score																3.8

Result: The Score of this Course is 3.8 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT –I KINEMATICS OF FLUIDS IN MOTION:
Real fluids and Ideal fluids- Velocity of a fluid at a point, Stream lines, path lines, steady and unsteady flows- The Velocity potential – The vorticity vector – Local and particle rates of changes – Equations of continuity- Worked examples- Acceleration of a fluid – Conditions at a rigid boundary.

UNIT – II: 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 a boundary of two inviscid immiscible fluids – Euler's equation of motion – Bernoulli's equation- worked examples- Discussion of the case of steady motion under conservative body forces.

UNIT –III SOME THREE-DIMENSIONAL FLOWS:
Introduction – Sources, Sinks, and doublets – Image in a rigid infinite plane – Axis symmetric flows.

UNIT – IV: SOME TWO-DIMENSIONAL FLOWS:
Meaning of two-dimensional flow – Use of Cylindrical polar coordinate – The stream function – The complex potential for two dimensional, irrotational incompressible flow- Complex velocity potentials for standard two dimensional flows- Some worked examples- Two dimensional Image systems- The Milne Thompson circle Theorem.

UNIT – V: VISCOUS FLOWS:
Stress components in a real fluid – Relations between Cartesian components of stress – Translational motion of fluid elements- The rate of strain quadric and principal stresses- some further properties of the rate of strain quadric – Stress analysis in fluid motion- Relation between stress and rate of strain – The coefficient of viscosity and Laminar flow – The Navier – Stokes equations of motion of a Viscous fluid.

TEXT BOOK:

1. F. Chorlton, Text Book of Fluid dynamics, CBS publications. Delhi, 1985.

   Unit 1 - Chapter 2. Sections 2.1 to 2.10, Unit 2 - Chapter 3 Sections 3.1 to 3.7

   Unit 3- Chapter 4 Sections 4.1, 4.2, 4.3, Unit 4 - Chapter 5 Sections 5.1 to 5.8

   Unit 5 - Chapter 8 Sections 8.1 to 8.9

REFERENCE BOOKS

1. R.W. Fox and A.T. McDonald. Introduction to Fluid Mechanics, Wiley, 1985.
2. E. Krause, Fluid Mechanics with problems and solutions, Springer, 2005.
3. B.S. Massey, J.W. Smith and A.J.W. Smith, Mechanics of Fluids, Taylor and Francis, New York, 2005.
4. P. Orlandi, Fluid Flow Phenomena, Kluwer, New York, 2002
5. T. Petrila, Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics, Springer,

I – M.Sc (Maths)	OPERATIONS RESEARCH	EPMT810T
SEMESTER – II	For the students admitted from the year 2014	HRS/WK – 6
ELECTIVE-II		CREDIT –4

OBJECTIVES:

The course aims to introduce PERT, CPM, deterministic and probabilistic inventory systems, queues, replacement, maintenance problems and simulation problems.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Acquires the knowledge of PERT – CPM calculation

CO2: develops the skill of analyzing the stock managements

CO3: exposed to identify and solve different queuing models

CO4: to optimize the outcome in production using Replacement models

CO5: gets knowledge on stocks, demand and supply for smooth business progress.

SEMESTER II	COURSE CODE: EPMT810T					COURSE TITLE: OPERATIONS RESEARCH									HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	3.9
CO2	3	4	4	4	3	3	3	4	4	4	3	4	4	4	3	3.6
CO3	4	3	4	4	4	4	4	4	3	4	4	4	3	4	4	3.8
CO4	4	4	3	3	4	3	4	4	4	4	4	3	4	4	4	3.7
CO5	4	4	4	4	4	4	4	4	4	3	4	4	4	3	4	3.9
Mean Overall Score																3.8

Result: The Score of this Course is 3.8 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: PROJECT MANAGEMENT: PERT AND CPM

Basic Difference between PERT and CPM – Steps in PERT/CPM Techniques- PERT/CPM Network Components and Precedence Relationships – Critical Path Analysis – Probability in PERT Analysis – Project time-cost Trade Off – Updating the Project – Resource Allocation.

UNIT - II: DETERMINISTIC INVENTORY CONTROL MODELS

Meaning of inventory Control – Functional Classification – Advantage of Carrying Inventory – Features of Inventory System – Inventory Model building – Deterministic Inventory Model with no Shortage – Deterministic Inventory with Shortages.

UNIT-III: QUEUES THEORY

Essential Features of Queueing System – Operating Characteristic of Queueing System – Probabilistic Distribution in Queueing Systems – Classification of Queueing Models – Solution of Queuing Models – Probability Distribution of Arrivals and Departures

UNIT-IV: REPLACEMENT AND MAINTANANCE MODELS

Failure Mechanism of Items – Replacement of Items Deteriorates with Time – Replacement of Items that fail completely – other Replacement Problems.

UNIT- V: SIMULATION

Introduction – Steps of Simulation Process – Advantages and Disadvantages of Simulation – Monte Carlo Simulation – Random Number Generation – Simulation Inventory Problems – Queuing Problems – PERT Problems.

TEXT BOOK:

1. JK. Sharma, Operations Research, MacMillan India, New Delhi, 2001.

Unit 1- Chapter 13: Sec. 13.1 to 13.9

Unit 2 - Chapter 14: Sec. 14.1 to 14.8

Unit 3 -Chapter 16: Sec. 16.1 to 16.7

Unit 4 - Chapter 17: Sec. 17.1 to 17.5

Unit 5 - Chapter 19: 19.1to 19.11, 19.13

REFERENCE BOOKS

1. Kanti Swarup, P.K. Gupta, Man Mohan - *Operations Research*, Sultan Chand & Sons, New Delhi.
2. F.S. Hillier and J. Lieberman - *Introduction to Operations Research* [8th Edition], Tata McGraw Hill Publishing Company, New Delhi,2006.
3. Beightler.C, D.Phillips, B. Wilde, *Foundations of Optimization* [2nd Edition] Prentice Hall Pvt Ltd., New York, 1979.

I – MSC. (Maths)	SPECIAL FUNCTIONS For the students admitted from the year 2017	EPMT810A
SEMESTER – II		HRS/WK – 6
ELECTIVE –II (OPTIONAL)		CREDIT – 4

OBJECTIVES:
To develop computational skill in certain special functions which are frequently occurring in higher mathematics and mathematical physics.

COURSE OUTCOME:
At the end of the course students will be able to
CO1: Students able to solve simultaneous linear differential equations.
CO2: Students able to determine the Numerical solution using Taylor series.
CO3: Students able to analyses problems in linear second order differential equations.
CO4: Students able to pertain Bessel functions and Legendre functions.
CO5: Students able to know Fourier series and Fourier integrals.

SEMESTER: II	COURSE CODE: EPMT810A					COURSE TITLE: SPECIAL FUNCTIONS									HOURS 6	CREDITS: 4
COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	4	4	3	3	4	5	5	2	4	3	5	2	3	4	3.6
CO2	3	4	3	3	3	4	5	5	2	4	3	5	2	2	4	3.46
CO3	3	4	4	3	3	4	4	5	2	4	3	5	2	2	4	3.46
CO4	3	4	4	3	3	4	5	5	2	4	3	5	3	2	4	3.6
CO5	3	4	3	3	3	4	5	5	2	4	3	5	2	2	4	3.46
Mean Overall Score																3.5

Result: The Score of this Course is 3.5 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I:
Properties of Linear Operators - Simultaneous Linear Differential Equations - Special Solvable Types of Nonlinear Equations.

UNIT-II:
Numerical Solutions Using Taylor Series - Adams and Modified Adams Method - Extrapolation with Differences

UNIT-III:
Properties of Power Series - Examples - Singular Points of Linear Second Order Differential Equations - Method of Frobenius.

UNIT-IV:
\Bessel Functions - Properties - Legendre Functions.

UNIT-V:
Term by Term Differentiation of Fourier Series, Legendre Series - Fourier Integral.

TEXT BOOK:

1. F.B. Hildebrand. (1977) Advanced Calculus for Applications. Prentice Hall. New Jersey. B.Sc. Mathematics: Syllabus (CBCS)

REFERENCE BOOKS:

1. J.N. Sharma and R.K. Gupta (1998) Special Functions, Krishna Prakashan Mandir, Meerut.
2. Satya Prakash. (2004) Mathematical Physics. Sultan & Sons. New Delhi.
3. B.D. Gupta (1978) Mathematical Physics, Vikas Publishing House.

II – M.Sc (Maths)	COMPLEX ANALYSIS-I	PMT911
SEMESTER – III	For the students admitted from the year 2008	HRS/WK – 6
CORE – IX		CREDIT – 5

OBJECTIVES:

The course aims to introduce the concepts of Analytic Functions Linear Transformations, Conformal Mappings, Complex Integration, Cauchy's Integral Formula, Calculus of Residues and Evaluation of Definite Integrals. Harmonic Functions.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: Explain fundamental concepts of complex analysis and the role in modern mathematics.
CO2: Apply calculus in complex domain.
CO3: Apply cauchy's theorem in evaluating integral in different domains.
CO4: Apply cauchy's integral formula in evaluating complex integrals.
CO5: Apply cauchy's residue theorem in evaluating harder integral

SEMESTER III	COURSE CODE: PMT911					COURSE TITLE: COMPLEX ANALYSIS - I									HOURS 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	4	4	3	3	2	2	2	2	4	3	4	3	4	5	3.1
CO2	3	4	3	3	3	2	2	2	2	5	4	5	4	5	5	3.5
CO3	3	4	4	3	3	2	2	2	2	5	4	5	4	5	5	3.6
CO4	3	4	4	3	3	2	2	2	4	4	3	5	3	2	5	3.2
CO5	3	4	3	3	3	3	4	5	2	4	3	4	2	2	4	3.3
Mean Overall Score																3.34

Result: The Score of this Course is 3.34 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I CONFORMALITY:

Arcs and closed curves, Analytic Functions in Regions, Conformal Mapping, Length and Area. Linear Transformations: The Linear Group, The Cross Ratio, Symmetry, Oriented Circles, Families of Circles.

UNIT-II: ELEMENTARY CONFORMAL MAPPINGS:

The Use of Level Curves, A Survey of Elementary Mappings, Elementary Riemann Surfaces. Complex Integration: Fundamental Theorems: Line Integrals, Rectifiable Arcs, Line Integrals as Functions of Arcs, Cauchy's Theorem for a Rectangle, Cauchy's theorem in a Disk.

UNIT-III: CAUCHY'S INTEGRAL FORMULA:

The Index of a Point with Respect to a Closed Curve, The Integral Formula, Higher Derivatives, Local Properties of Analytical Functions: Removable Singularities, Taylor's Theorem, Zeros And Poles, The Local Mapping, The Maximum Principle.

UNIT-IV: THE GENERAL FORM OF CAUCHY'S THEOREM AND THE CALCULUS OF RESIDUES:

Chains and Cycles, Simple Connectivity, Homology, The General Statement of Cauchy's Theorem, Proof of Cauchy's Theorem, Locally Exact Differentials, Multiply Connected Regions. The Residue Theorem, The Argument Principle.

UNIT-V: DEFINITE INTEGRAL AND HORMONIC FUNCTION

Evaluation of Definite Integrals. Harmonic Functions: Definition and Basic Properties, the Mean-value Property, Poisson's Formula, Schwarz's Theorem, The Reflection Principle.

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TEXT BOOK:

1. COMPLEX ANALYSIS by Lars V.Ahlfors (Third Edition)

   CHAPTER 3: 2.1 to 4.3

   CHAPTER 4: 1.1 to 6.5

REFERENCE BOOKS:

1. H.A Presly, "Introduction to Complex Analysis", Clarendon Press, Oxford,1990.
2. J.B. Conway, "Functions of one complex variables, Springer- Verlag, International student edition, Naroser Publishing Co. 1978.
3. E. Hille, Analytic function theory, Gonm & Co., 1959.
4. M. Heins, "Complex function Theory, Academic Press, New York, 1968.

II – M.Sc (Maths)	TOPOLOGY For the students admitted from the year 2014	PMT912S
SEMESTER – III		HRS/WK – 6
CORE – X		CREDIT – 5

OBJECTIVES:

The course aims to introduce the concepts of Metric spaces, Topological spaces, Separation axioms, Compact spaces and connected spaces.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: To understand Concept such as open set, closed set, interior, closure related to Topology

CO2: Create new topological by using sub spaces

CO3: To understand Concepts of Compactness and ability to analysis the related theorem

CO4: construct the completely regular spaces and normal spaces in topology.

CO5: Demonstrate a Weierstrass approximation theorem in locally connected spaces

SEMESTER III	COURSE CODE: PMT912S					COURSE TITLE: TOPOLOY									HOURS: 6	CREDIT: 5
COURSE OUTCOME	PROGRAMME OUTCOME (PO)					PROGRAMME SPECIFIC OUTCOME(PSO)										
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO2	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	MEAN SCORE OF CO'S
CO1	4	5	4	3	2	3	5	4	5	5	2	5	2	4	5	3.9
CO2	3	4	5	2	2	3	4	5	5	5	2	5	2	4	5	3.7
CO3	4	5	4	2	2	3	5	4	5	5	2	5	2	3	5	3.7
CO4	3	5	4	3	2	2	3	4	5	5	2	5	2	4	5	3.6
CO5	3	5	5	2	2	3	3	4	5	5	2	5	2	4	5	3.7
Mean Overall Score																3.72

Result: The Score of this Course is 3.72 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT-I: **METRIC SPACES**:
The definition and some examples- Open sets- Closed sets- Convergence, completeness and Baire' s theorem-Continuous Mappings-Spaces of continuous functions-Euclidean and unitary spaces

UNIT-II: **TOPOLOGICAL SPACES:**
The definition and some examples-Elementary concepts-Open bases and open subbases-Weak topologies-The function algebras $\ell(X,R)$ and $\ell(X,C)$

UNIT-III: **COMPACTNESS:**
Compact spaces-Products of spaces-Tychonoff's theorem and locally compact spaces-Compactness for metric spaces-Ascoli's theorem

UNIT-IV: **SEPARATION**:
T_1-spaces and Hausdorff spaces-Completely regular spaces and normal spaces-Urysohn's lemma and the Tietze extension theorem-The Urysohn imbedding theorem- The Stone-Cech compactification.

UNIT-V: CONNECTEDNESS:
Connected spaces-The components of a space-Totally disconnected spaces-Locally connected spaces-The Weierstrass approximation theorem

TEXT BOOK:

1. GEORGE F. SIMMONS, Introduction to Topology & Modern Analysis Mc Graw Hill International Edition, New York-1963

Unit I: chapter 2; sec 9 to 15

Unit II: chapter 3; sec 16 to 20

Unit III: chapter 4; sec 21 to 25

Unit IV: chapter 5; sec 26 to 30

Unit V: chapter 6; sec 31 to 34, chapter 7; sec 35

REFERENCE BOOKS:

1. James R. Munkers "TOPOLOGY A FIRST COURSE" Second edition, Prentice Hall of India Ltd, New Delhi.
2. Seymour Lipschitz "GENERAL TOPOLOGY", Schaum's outline series McGraw Hill Book company.
3. M.L. Khanna- "TOPOLOGY", Jayaprakashnath & co, Meerut, India.
4. B.C. Chattargee, S. Ganguly, M.R. Athikari- "A TEXT BOOK OF TOPOLOGY", Asian Books Private limited, New Delhi.

II – M.Sc (Maths)	DIFFERENTIAL GEOMETRY	PMT913S
SEMESTER – III	For the students admitted form the year 2015	HRS/WK – 6
CORE – XI		CREDIT – 5

OBJECTIVES:

This course introduces space curves and their intrinsic properties of a surface and geodesics. Further the non-intrinsic properties of surface and the differential geometry of surfaces are explored.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: To understand the concept of Space Curve and learn to classify the standard examples. In particular contact between curves and surfaces, Involutes, Evolutes, Serent Ferent Formula.

CO2: To Learn Properly in Space Curves, Fundamental Existence in Space Curves

CO3: Understanding of Intrinsic Properties and it's related to other discipline.

CO4: Calculate the Gaussian Curvature, Mean curvature, the geodesics of the surfaces

CO5: Capability to analysis Non-Intrinsic Properties of surfaces

SEMESTER III	COURSE CODE: PMT913S					COURSE TITLE: DIFFERENTIAL GEOMETRY										HOURS 6	CREDIT 5
COURSE OUTCOME	PROGRAM OUTCOME (PO)					PROGRAM SPECIFIC OUTCOME(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSo6	PSO7	PSO8	PSO9	PSO10		
CO1	4	5	3	3	2	4	5	3	3	5	3	4	2	4	4	3.6	
CO2	5	4	3	2	2	5	5	3	2	5	3	4	2	5	4	3.6	
CO3	4	4	3	2	2	5	4	5	3	4	4	5	2	4	5	3.7	
CO4	5	5	5	4	2	5	4	5	3	4	3	5	2	5	5	4.1	
CO5	5	5	5	3	2	4	5	3	3	4	4	5	2	5	5	4.0	
Mean Overall Score																3.8	

Result: The Score of this Course is 3.8 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with Programme outcomes and Programme specific outcomes.

UNIT – I: SPACE CURVES:

Definition of space curve - Arc length – Tangent, normal and binormal – Curvature and torsion – Contact between curves and surfaces – Tangent surfaces -Involutes and evolutes.

UNIT- II: SPACE CURVES (Continued)

Intrinsic equations – Fundamental existence theorem for space curves – Helices.

INTRINSIC PROPERTIES OF A SURFACE: Definition of a surface – curves on a surface - Surface of revolution

UNIT - III: INTRINSIC PROPERTIES OF A SURFACE (Continued)

Helicoids – Metric – Direction coefficients – Family of curves – Isometric correspondence – Intrinsic properties.

UNIT - IV: GEODESICS:

Geodesics – Canonical geodesic equations – Normal property of geodesics – Existence theorems- Geodesic parallels – Geodesics curvature – Gauss Bonnet theorem

UNIT – V: NON - INTRINSIC PROPERTIES OF A SURFACE:

The second fundamental form – Principal curvature – Lines of curvature – Developable – Developable associated with space curves

TEXT BOOK:

1. T.J. Wilmore, An Introduction of Differential Geometry, Oxford University Press, (17th Impression) New Delhi 2002. (Indian Print)

Unit I: Chapter I: Sections 1 to 7.
Unit II: Chapter I: Section 8 &9; Chapter II: Sections 1 to 3
Unit III: Chapter II: Sections 4 to 9
Unit IV: Chapter II: Sections10 to 16
Unit V: Chapter III: Sections 1 to 5.

REFERRENCE BOOKS:

1. Wilhelm Klingender, A course in Differential Geometry, Graduate Texts in Mathematics, Springer-verlag 1978.
2. J.A. Thorpe, Elementary topics in Differential Geometry, under – graduate Texts in Mathematics, Springer-verlag 1978.
3. M. L. Khanna, Differential Geometry, Jai Prakash Nath & Co., Meerut City
4. Mittal, Agarwal, Differential Geometry, Krishna Prakashan Media (P) Ltd. Meerut City
5. Nirmala Prakash, Differential Geometry, Tata McGraw – Hill Publishing company Ltd, New Delhi.

II – M.Sc (Maths)	NUMBER THEORY AND CRYPTOGRAPHY	PMT914A
SEMESTER – III		HRS/WK – 5
CORE – XII	For the students admitted form the year 2020	CREDIT – 3

OBJECTIVES:

The course aim is to introduce the concept divisibility and Euclidean algorithm, quadratics residues and reciprocity, encryption and decryption, primality test.

COURSE OUTCOME:

CO1: Students able to understand the divisibility and Euclidean algorithm.
CO2: Students able to understand quadratics residues and reciprocity.
CO3: Students able to analyse encryption and decryption.
CO4: Students able to do the primality test.
CO5: Students able to the determine the elliptic curve primality test.

SEMESTER III	COURSE CODE: PMT914A					COURSE TITLE: NUMBER THEORY AND CRYPTOGRAPHY									HOURS 5	CREDITS 3
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	4	4	3	3	4	5	5	2	4	3	5	2	3	4	3.6
CO2	3	4	3	3	3	4	5	5	2	4	3	5	2	2	4	3.46
CO3	3	4	4	3	3	4	4	5	2	4	3	5	2	2	4	3.46
CO4	3	4	4	3	3	4	5	5	2	4	3	5	3	2	4	3.6
CO5	3	4	3	3	3	4	5	5	2	4	3	5	2	2	4	3.46
						Mean Overall Score										3.5

Result: The Score of this Course is 3.5 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with Programme outcomes and Programme specific outcomes.

UNIT-I: INTRODUCTION TO NUMBER THEORY

Time estimates for doing arithmetic-Divisibility and the Euclidean algorithm-Congruences-Model exponentiation-Some applications to factoring.

Chapter 1: Sec (1.1,1.2,1.3,1.4)

UNIT-II: QUARATICS RESIDUES AND RECIPROCITY

Finite Fields-Multiplication Generators-Uniqueness of fields with prime power elements-Quadratic residues and reciprocity.

Chapter 2: Sec (2.1,2.2)

UNIT-III: CRYPTOSYSTEMS

Some simple crypto systems- Digraph Transformation-Enciphering Matrices-Affine enchipering transformation RSA- Discrete log- Diffie-Hellman Key exchange-The massey- Omura Cryptosystem-Digital signature standard- Computation of discrete log.

Chapter 3: Sec (3.1,3.2)

UNIT-IV: PRIMALITY AND FACTORING-I

Pseudoprimes- Strong pseudo primes- Solvay- Strassen primality test- Miller- Rabin test- Rho method-Fermat factorization and factor bases.

Chapter 5: Sec (5.1,5.2,5.3)

UNIT-V: PRIMALITY AND FACTORING-II

Elliptic curves-Elliptic curve primality test – Elliptic curve factorization: pollard's p-1 method – Elliptic curve reduction modulo n – Lenstras method.

Chapter 6: Sec (6.1,6.3,6.4)

TEXT BOOK:

1. Neal Koblitz," A course in number theory and cryptography",2nd Edition, Springer-Verlag,1994.
   Unit I: Chapter 1: Sec (1.1,1.2,1.3,1.4),
   Unit II: Chapter 2: Sec (2.1,2.2),
   Unit III: Chapter 3: Sec (3.1,3.2),
   Unit IV: Chapter 5: Sec (5.1,5.2,5.3),
   Unit V: Chapter 6: Sec (6.1,6.3,6.4).

REFERENCE BOOK:

1. MenezesA, " Van Oorschot and Vanstone S.A ,Hand book of applied cryptography", CRC press, 1996.
2. An Introduction to Theory of Number by Ivan Nivan, Herbert S. Zuckerman and Hugh L. Montgomery , John Wiley & Sons, Inc, 1991 (5th Edition)

II – M.Sc (Maths)		**EPMT915**
SEMESTER – III	**FUZZY SUBSETS AND ITS APPLICATION**	**HRS/WK – 5**
Elective – III	**For the students admitted from the year 2008**	**CREDIT –3**

OBJECTIVES:
This course aims to offer fuzzy graphs, fuzzy relation, fuzzy logic and fuzzy composition.

COURSE OUTCOMES:
CO1: Acquire knowledge on the basic definitions and fundamentals of Fuzzy set theory.
CO2: Able to get ideas on Fuzzy graphs and its properties
CO3: Improve their ability in the concept of Fuzzy relations
CO4: Attain knowledge of the Fuzzy Logic in different forms
CO5: Understand the applications of Fuzzy logic

SEMESTER III	COURSE CODE EPMT915					COURSE TITLE: FUZZY SUBSETS AND ITS APPLICATION									HOURS 5	CREDITS 3
COURSE OUTCOMES	PROGRAMME OUTCOMES (PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	3	4	3	3	4	3	3	4	3	3	4	4	4	4	3.5
CO2	3	4	3	4	3	3	4	4	4	4	4	3	3	3	4	3.5
CO3	4	3	4	3	4	3	4	4	3	4	4	4	4	3	3	3.6
CO4	3	4	4	4	3	4	4	3	3	3	3	3	4	3	3	3.4
CO5	4	3	3	3	4	3	3	4	3	4	4	3	3	4	4	3.5
Mean Overall Score																3.5

Result: The Score of this Course is 3.5 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT –I: FUNDAMENTAL NOTION:

Introduction –Review of the notion of membership-Concept of fuzzy subsets-Dominance Relation-Simple operation- Set of fuzzy subsets for E and M Finite-Properties of fuzzy subsets –Product and algebraic sum of two fuzzy subsets-problems.

UNIT –II: FUZZY GRAPHS:

Introduction – Fuzzy graphs –Fuzzy relation -Composition of Fuzzy relation –Fuzzy subsets induced by the mapping –Conditioned fuzzy subsets-Properties of fuzzy binary relation-Transitive closure – Paths in finite Fuzzy Graphs-Problems.

UNIT-III: FUZZY RELATION:

Fuzzy Preorder relation –Similitude- Similitude sub relation –Anti symmetry –Fuzzy order relation – Anti-symmetry relations without loops-Ordinal relations- Ordinal functions-Dissimilitude –Resemblance –Properties of Similitude and Resemblance –Properties of Fuzzy perfect order relation –Problems.

UNIT-IV: FUZZY LOGIC:

Introduction –Characteristic functions of a fuzzy subsets-Fuzzy variables –Polynomial forms –Analysis of function of Fuzzy variables –Method of marinos –Logical structure.

UNIT-V: APPLICATIONS:

Introduction – Engineering – Medical– Economics – Soft Computers

TEXT BOOKS:

1. A. Kaufman, Introduction to the theory of Fuzzy subsets, Vol I, (1975) Academic Press, New York, (For unit – I to unit IV)
2. George J. Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic Theory and Applications, (2001) Prentice Hall India, New Delhi, (Unit – V Only)
   Unit 1 Chapters1:sec 1 to 9, Unit 2 Chapters2: sec10 to 18
   Unit 3 Chapters2:sec 19 to 29
   Unit 4 Chapters3:sec 31 to35(Omit 33)
   Unit 5 Chapters5: [“Fuzzy sets and Fuzzy Logic Theory and Applications”] – George. J.Klir

REFERENCE BOOK:

1. H. J. Zimmermann, Fuzzy set Theory and its Applications,(1996.) Allied Publications,Chennai,

II – M.Sc. (Maths)	**INTEGRAL TRANSFORMS**	**EPMT915A**
SEMESTER – III	**For the students admitted from the year 2017**	**HRS/WK –5**
ELECTIVE-III (OPTIONAL)		**CREDIT –3**

OBJECTIVES:
To understand integral equations, to focus on easily applicable techniques and to emphasize linear integral equations of the second kind.

COURSE OUTCOMES:
CO1: Enables to classify, convert and solve linear equations, IVP and BVP
CO2: Attains knowledge on Fredholm Integral Equation
Able to get ideas on Fuzzy graphs and its properties
CO3: Improves their understanding ability on Volterra Integral Equations
CO4: Attains knowledge on Integra-Differential Equations
CO5: understands the idea on Singular Integral Equations

SEMESTER III	COURSE CODE: EPMT915A					COURSE TITLE: INTEGRAL TRANSFORMS										HOURS 5	CREDITS 3
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	4	3	3	4	4	4	4	3	3	3	3	3	4	4	4	3.5	
CO2	3	3	4	3	4	3	4	4	4	3	4	4	4	3	3	3.5	
CO3	4	4	4	4	4	4	3	3	3	3	3	4	2	3	4	3.5	
CO4	5	4	3	3	3	4	2	4	3	4	4	3	4	3	3	3.5	
CO5	4	3	3	4	3	3	4	4	4	3	4	4	3	4	4	3.6	
Mean Overall Score																3.5	

Result: The Score of this Course is 3.5 (High)

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Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes

UNIT I: INTRODUCTORY CONCEPTS:

Definitions - Classification of Linear Integral Equations - Solution of an Integral Equation - Converting Volterra Equation to ODE - Converting IVP to Volterra Equation - \Converting BVP to Fredholm Equation

UNIT II: FREDHOLM INTEGRAL EQUATIONS:

Introduction - The Decomposition Method - The Direct Computation Method - The Successive Approximations Method - The Method of Successive Substitutions - Comparison between Alternative Methods - Homogeneous Fredholm Equations

UNIT III: VOLTERRA INTEGRAL EQUATIONS:

Introduction -The Adomian Decomposition Method - The Series Solution Method - Converting Volterra Equation to IVP - Successive Approximations Method - The Method of Successive Substitutions - Comparison between Alternative Methods - Volterra Equations of the First Kind

UNIT IV: INTEGRA-DIFFERENTIAL EQUATIONS:

Introduction - Fredholm Integro-Differential Equations - Volterra Integro-Differential Equations

UNIT V: SINGULAR INTEGRAL EQUATIONS:

Definitions - Abel's Problem - The Weakly-Singular Volterra Equations.

TEXT BOOK:

1. A First course in integral equations –A.M. Wazwaz (1997) (world Scientific)

REFERENCE BOOK:

1. Introduction to Integral Equation with Applications –A.J. Jerri (1999) Second edition Wiley Interscience.

II – M.Sc (Maths)	COMPLEX ANALYSIS-II	PMT1016
SEMESTER – IV	For the students admitted from the year 2008	HRS/WK – 6
CORE – XIII		CREDIT – 5

OBJECTIVES

The course aims to introduce the concepts of Power Series Expansions, Jensen's Formula, The Riemann Zeta Function, Arzela's Theorem, The Riemann Mapping Theorem, Conformal Mapping of Polygons, Simply Periodic Functions, Doubly Periodic Functions and The Weierstrass Theory

COURSE OUTCOME:

At the end of the course students will be able to

C01: Compute the Taylor's and Laurent expansion of simple functions, determine the singularity.

C02: manipulate and explicit analytic expression for exponential and trigonometric functions.

C03: understand the Riemann zeta functions and its role in application of complex analysis to number theory.

C04: Apply Normality, Equi- continuity, compactness properties of family of family of analytic function.

C05: Apply Riemann mapping theorem in mapping of multiply connected region, Apply reflection principle in simple connected region.

SEMESTER IV	COURSE CODE: PMT1016					COURSE TITLE: COMPLEX ANALYSIS -II									HOURS 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	3	4	3	3	2	3	3	3	3	3	4	3	2	4	3.1
CO2	3	4	4	3	3	2	2	3	3	4	3	5	2	3	5	3.3
CO3	3	4	4	3	3	2	3	4	2	4	5	4	3	2	5	3.0
CO4	3	4	5	3	3	2	3	4	2	4	3	4	2	3	5	3.1
CO5	3	4	4	3	3	3	4	4	2	4	3	4	2	2	5	3.3
Mean Overall Score																3.16

Result: The Score of this Course is 3.16 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: POWER SERIES EXPANSIONS:

Weierstrass's Theorem, the Taylor Series and The Laurent Series. Partial Fractions and Factorization: Partial Fractions, Infinite Products, Canonical Products, the Gamma Function

UNIT-II: ENTIRE FUNCTIONS:

Jensen's Formula, Hadamard's Theorem. The Riemann Zeta Function: The Product Development, Extension of (s) to the Whole Plane, The Functional Equation, The Zeros of the Zeta Function.

UNIT-III: NORMAL FAMILIES:

Equicontinuity, Normalitiy and Compactness, Arzela's Theorem, Families of Analytic Functions, The Classical Definition. The Riemann Mapping Theorem, Boundary Behavior, Use of the Reflection Principle.

UNIT-IV: CONFORMAL MAPPING OF POLYGONS:

The Behavior at an Angle, The Schwarz-Christoffel formula, Mapping on a Rectangle. A Closer Look at Harmonic Functions: Functions with the Mean-Value Property, Harnack's Principle. Simply Periodic Functions: Representation by Exponentials, The Fourier Development, Functions of Finite Order.

UNIT-V: DOUBLY PERIODIC FUNCTIONS:

The Period Module, Unimodular Transformations, The Canonical Basis, General Properties of Elliptic Functions. The Weierstrass Theory: The Weierstass -function, The Functions (z) and (z),The Differential Equation.

TEXT BOOK:

1. COMPLEX ANALYSIS by Lars V. Ahlfors (Third Edition)

CHAPTER 5:1.1 to 5.5(omit2.5)
CHAPTER 6: 1.1 to 3.2(omit1.4&2.4)
CHAPTER 7: 1.1 to 3.3

REFERENCE BOOKS:

1. H.A Presfly, "Introduction to Complex Analysis", Clarendon Press, Oxford, 1990.
2. J.B. Conway, "Functions of one complex variables, Springer- Verlag, International student edition, Naroser Publishing Co. 1978.
3. E. Hille, Analytic function theory, Gonm & Co., 1959.
4. M. Heins, "Complex function Theory, Academic Press, New York

II – M.Sc (Maths)	FUNCTIONAL ANALYSIS	PMT1017
SEMESTER – IV	For the students admitted from the year 2008	HRS/WK – 6
CORE – XIV		CREDIT – 5

OBJECTIVES

The course aims to introduce the concepts of Banach spaces, Hilbert spaces, normal and unitary operators, Finite dimensional spectral theory and General preliminaries on Banach algebras.

COURSE OUTCOME:

At the end of the course students will be able to

CO1: To understand the concept of Banach Space and learn to classify some standard examples

CO2: To understand the concept of Hilbert Space and learn to classify some standard examples

CO3: To Learn to Properly the specific Techniques for bounded operator over normed and Hilbert Space

CO4: To understand How to use the main Properties of Compact Operator

CO5: To understand the concept of Banach Algebra

SEMESTER IV	SUB CODE: PMT1017					COURSE TITLE: FUNCTIONAL ANALYSIS									HOURS: 6	CREDIT: 5
COURSE OUTCOME	PROGRAMME OUTCOME (PO)					PROGRAMME SPECIFIC OUTCOME(PSO)										
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO2	PSO4	PSO5	PSo6	PSO7	PSO8	PSO9	PSO 10	Mean Score of CO's
CO1	4	5	4	3	2	2	4	4	4	5	2	5	2	5	4	3.7
CO2	5	5	5	4	2	2	5	3	5	4	2	4	2	5	4	3.8
CO3	3	4	4	3	2	2	4	4	5	5	2	4	2	3	3	3.3
CO4	4	5	3	4	2	2	5	3	5	4	2	4	2	4	5	3.6
CO5	3	5	5	3	2	2	5	5	5	4	2	5	2	5	5	3.9
Mean Overall Score																3.66

Result: The Score of this Course is 3.66 (High)

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Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes

UNIT I: BANACH SPACES:
Definition - examples-continuous linear transformations-The Hahn-Banach theorem-the natural embedding of N^* in to N^{**} - open mapping theorem-conjugate of an operator.

UNIT II: HILBERT SPACES:
Definition– examples-simple properties-orthogonal complements-orthonormal sets

UNIT III: HILBERTSPACES (Continued)
conjugate space H^* -ad joint of an operator-self adjoint operators-normal and unitary operators- Projections.

UNIT IV: FINITE DIMENSIONAL SPECTRAL THEORY:
Matrices-Determinants and the spectrum of an operator- The spectral theorem-A survey of the situation.

UNIT V: GENERAL PRELIMINARIES ON BANACH ALGEBRAS:
Definition – examples-regular and singular elements- Topological divisors of zero- The spectrum- The formula for spectral radius- The radical and semi-simplicity.

TEXT BOOK:

1. G.F. SIMMONS, "Introduction to TOPOLOGY AND MODERN ANALYSIS", McGraw Hill International Edition, New York 1963.

Unit 1 Chapter 9: sec 46 to 51,

Unit 2 Chapter 10:sec 52,53,54,

Unit 3 Chapter 10:sec 55 to 59

Unit 4 Chapter 11:sec 12, 64 to 69,

Unit 5 Chapter 12:sec 64 to 69

REFERENCE BOOKS:

1. Walter Rudin, "Functional analysis", Tata Mc Graw Hill Publishing company, New Delhi1973
2. M.L. Khanna "Functional analysis", Jayaprakashnath & co, Meerut, India1988.
3. G. Bachman & L. Narici, "Functional analysis" Academic Press, New York1966.
4. S. Ponnusamy, "Foundations of Functional Analysis", Narosa Publishing House, New Delhi.

II – M.Sc (Maths)		**PMT1019T**
SEMESTER – IV	**PARTIAL DIFFERENTIAL EQUATIONS**	**HRS/WK – 6**
CORE – XV	**For the students admitted from the year 2017**	**CREDIT –5**

OBJECTIVES

The course aim is to introduce the concept of equations of the first order and higher degree, elliptic differential equation, parabolic differential equation, hyperbolic differential equations.

COURSE OUTCOME

At the end of the course students will be able to

CO1: Use knowledge of partial differential equation (PDE), partial differential equation of first order.

CO2: Formulate fundamental concepts, second order PDE.

CO3: Understand analogies between elliptic differential equations.

CO4: Classify PDE and apply parabolic differential equation for a circle.

CO5: Solve practical PDE problems with hyperbolic differential equations.

SEMESTER IV	COURSE CODE: PMT1019T					COURSE TITLE: PARTIAL DIFFERENTIAL EQUATIONS										HOURS: 6	CREDITS 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	4	4	3	3	4	3	4	5	2	4	2	3	3	4	5	3.5	
CO2	3	2	4	2	4	2	3	5	3	4	2	3	2	4	5	3.2	
CO3	4	3	4	4	2	3	4	5	2	4	2	3	3	4	5	3.5	
CO4	3	2	3	4	3	2	3	5	3	3	2	3	2	3	5	3.1	
CO5	4	3	2	3	3	2	3	5	2	3	2	3	2	3	5	3.0	
Mean Overall Score																3.3	

Result: The Score of this Course is 3.3 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very poor	Poor	Moderate	High	Very High

This course is having **HIGH** association with programme outcomes and programme specific outcomes.

UNIT – I: PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER:
Formation of Partial differential Equation - Solution of Partial Differential Equations of First order - Integral Surfaces passing through a given curve - The Cauchy Problem for First Order Equations - Compatible System of First Order Equation - Charpit's Method

UNIT-II: FUNDAMENTAL CONCEPTS:
Introduction - Classification of Second Order PDE - Canonical Forms - Adjoint Operators - Riemann's Method

UNIT –III: ELLIPTIC DIFFERENTIAL EQUATIONS:
Occurrence of the Laplace and Poisson Equation – Boundary Value Problem (BVPs) – Separation of Variables – Dirichlet Problem for a rectangle – Interior Dirichlet Problem for a circle – Exterior Dirichlet Problem for a circle – Miscellaneous Examples

UNIT – IV: PARABOLIC DIFFERENTIAL EQUATIONS:
Occurrence of Diffusion Equation – Boundary Condition – Elementary solution for the Diffusion Equation – Dirac Delta Function – Separation of Variable method - Miscellaneous Examples

UNIT – V: HYPERBOLIC DIFFERENTIAL EQUATIONS:
Occurrence of Wave Equations – Derivation of One dimensional Wave Equation – Solution of One dimensional Wave Equation by Canonical Reduction – The Initial value Problem; D' Alembert's Solution – Vibrating String – Variable Separable Solution – Forced Vibrations – Solution of Non-homogeneous Equation – Boundary and Initial Value Problem for Two-dimensional Wave-Periodic Solution of One-dimensional Wave Equation in Cylindrical Coordinates – Miscellaneous Examples

TEXT BOOK:

1. K. Sankara Rao, Introduction to Partial Differential Equations, Prentice Hall of India, New Delhi, 2007.

REFERENCE BOOKS:

1. J. N. Sharma and Kehar Singh, Partial Differential Equations for Engineers and Scientists – Narosa Publishing House, New Delhi, 2000.
2. M. D. Raisinghania Advanced Differential Equations, S. Chand & Company Ltd, New Delhi, 2001.
3. Robert C. McOwen, Partial Differential Equations, Pearson Education, 2004.

II – M.Sc (Maths)	GRAPH THEORY	EPM1020
SEMESTER – IV	For the student admitted from the year 2012	HRS/WK – 6
Elective – IV		CREDIT –4

OBJECTIVES

This course introduces the application of graph theory in various field.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Develops the skill of calculating minimum shortest path in a weighted graph.

CO2: Learns to get a minimum weighted complete graph using krushal algorithm.

CO3: Knows to determine the good solution for travelling sales man problem.

CO4: Collectively solve the time tabling problem using edge colorings.

CO5: Enables to understand the characterization of planar graph and dual, vertex coloring and its application.

SEMESTER IV	COURSE CODE: EPM1020					COURSE TITLE: GRAPH THEORY									HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES (PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	3	5	4	4	3	3	5	3	4	4	3	4	4	4	4	3.8
CO2	4	5	3	4	3	4	4	3	5	4	3	4	5	3	5	3.9
CO3	4	4	4	3	3	5	5	3	4	5	2	3	5	4	4	3.8
CO4	3	5	3	4	3	5	5	3	4	4	3	4	5	3	5	3.9
CO5	3	4	3	4	4	3	5	4	4	5	3	4	4	3	4	3.8
Mean Overall Score																3.8

Result: The Score of this Course is 3.8 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes

UNIT-I: GRAPHS & SUBGRAPHS
Paths & Connection-cycles. Application: The Shortest Path Problem-Sperner's lemma.

UNIT-II: TREES&CONNECTIVITY
Trees-cut edges and bonds-cut vertices- Cayley's formula. Application: The connector Problem
Connectivity: Connectivity-Blocks. Applications: Constructions of Reliable communication networks.

UNIT-III: EULER TOURS&HAMILTONIAN CYCLES
Euler Tours & Hamilton Cycles. Application: The Chinese postman Problem –The travelling sales man problem.

UNIT-IV: EDGE COLOURINGS&INDEPENDENT SETS
Edge chromatic number-vising's theorem, independent sets-Ramsey's theorem. Application: The time tabling Problem.

UNIT-V: VERTEX COLOURINGS
Chromatic number-Brooke's theorem-Hajose' Conjecture-Chromatic polynomials. Applications: A Storage problem, Plane & Planar graphs-Dual graphs-Kuratowski's theorem.

TEXT BOOK:

1. Bondy J.A& Murthy U.S.R, Graph theory and its applications.

Unit 1 chapter 1 Sections 1.6, 1.7, 1.8,1.9

Unit 2 chapter 2 Sections – 2.1, 2.2, 2.3, 2.4, 2.5, chapter 3; 3.1, 3.2, 3.3

Unit 3 chapter 4; Sections –4.1, 4.2, 4.3,4.4

Unit 4 chapter 6; Sections –6.1, 6.2, 6.3, 7.1, 7.2,

Unit 5 chapter 8; Sections – 8.1, 8.2, 8.3, 8.4, 8.6, 9.1, 9.2, 9.5

. **REFERENCE BOOKS:**

1. R. Balakrishanan & K. Ranganathan, A Text book of graph theory, Springer 2000.
2. F. Harary, Graph theory-Addison Wesley, 1969.
3. "Graphs: Theory and Algorithms" by Thulasiraman and M.N.S Swamy, John Wiley & Sons, 1992.

II – M.Sc. (Maths)	FORMAL LANGUAGES AND AUTOMATA THEORY	EPM1020A
SEMESTER – IV		HRS/WK – 6
ELECTIVE – IV(optional)	For the students admitted from the year 2008	CREDIT –4

OBJECTIVES

The course aims to introduce the concepts of **Finite Automata,** Regular expression, and regular sets, Context-Free Grammars, Pushdown Automata and Properties of Context-Free Languages

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Know the concepts of finite automata, nondeterministic finite automata and finite automata move.

CO2: Learns the concepts of regular expression and pumping lemma for regular sets.

CO3: Know the concepts of free grammars and simplification of context.

CO4: Enables to understand the pushdown automata and free languages.

CO5: Able to understand the properties of context-free languages.

SEMESTER: IV	COURSE CODE: EPM1020A					COURSE TITLE FORMAL LANGUAGES AND AUTOMATA THEORY									HOURS 6	CREDITS 4
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)									MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	
CO1	4	5	3	4	3	4	4	3	5	4	3	4	5	3	5	3.9
CO2	4	4	4	3	3	5	5	3	4	5	2	3	5	4	4	3.8
CO3	4	4	4	3	3	5	5	3	4	5	2	3	5	4	4	3.8
CO4	3	4	3	4	4	3	5	4	4	5	3	4	4	3	4	3.8
CO5	4	4	3	4	3	4	4	3	4	4	3	4	4	3	4	3.6
Mean Overall Score																3.7

Result: The Score of this Course is 3.7 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I: FINITE AUTOMATA:
Finite state systems- Basic Definitions-Nondeterministic finite automata- Finite Automata with moves

UNIT-II: REGULAR EXPRESSION AND REGULAR SETS:
Regular expressions- The Pumping lemma for regular sets

UNIT-III: CONTEXT-FREE GRAMMARS:
Context-free grammars- derivation trees (definition and examples only). Simplification of context-free grammars - chomsky normal form- Greibach normal form

UNIT-IV: PUSHDOWN AUTOMATA:
Definitions-Pushdown Automata and context-free languages.

UNIT-V: PROPERTIES OF CONTEXT-FREE LANGUAGES:
The Pumping lemma for CFL's- Closure properties for CFL.

TEXT BOOK

1. Introduction to Automata Theory, Languages and Computation "by John E. Hop craft and Jeffrey D.Ullman. Narosa Publishing House, New Delhi, 1987.

REFERENCE BOOKS

1. Introduction to Languages and theory of Computations by John C. Martin (2nd Edition) Tata- McGraw Hill Company Ltd, New Delhi, 1999
2. A. Salomaa, Formal Languages, Academic Press, New York, 1973.

I-MSC (CS)	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE	PCS701S
SEMESTER – I		HRS/WK – 4
CORE – I	For the students admitted from the year 2011	CREDIT – 3

OBJECTIVES

The course aim is to introduce the concepts of operations on set and applications, logical operators, finite automata, equivalence of finite automata and pushdown automata.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Know the basic concepts of operations on sets, relations and functions.
CO2: Learns to solve the logical operators and know the tautology concepts.
CO3: Know the concepts of finite automata and language accepted by a finite automata.
CO4: Know the concepts of equivalence of finite automata and nondeterministic finite automata.
CO5: Enables to understand the pushdown automata, acceptance by pushdown automata and important properties of move relation.

SEMESTER: I	COURSE CODE: PCS701S					COURSE TITLE: MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE										HOURS 4	CREDITS 3
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10		
CO1	3	5	2	2	4	3	5	5	2	4	3	3	3	3	4	3.4	
CO2	4	5	3	4	3	4	4	3	5	4	3	4	5	3	5	3.9	
CO3	4	4	4	3	3	5	5	3	4	5	2	3	5	4	4	3.8	
CO4	3	5	3	3	4	5	5	3	4	4	3	4	5	3	5	3.9	
CO5	4	3	3	4	4	3	5	4	4	5	3	4	4	3	4	3.8	
Mean Overall Score																3.7	

Result: The Score of this Course is 3.7 (High)

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

This Course is having **HIGH** association with Programme Outcomes and Programme Specific Outcomes.

UNIT-I:

Set Theory – Introduction – Sets - Notations and Descriptions of Sets - Subsets-Operations on Sets - Properties of Set Operations -Verification of the Basic Laws of Algebra -Cartesian product of two sets - Relations-Representation of a Relation - Operations on Relations-Equivalence Relations - Partition and Equivalence Classes – Functions - One-to-one and Onto Functions - Special types of Functions-Invertible Functions - Composition of Functions.

UNIT-II:

Logic – Introduction - TF Statements – Connectives - Compound Statements -Truth Table of a Formula – Tautology - Tautology Implications and Equivalence of Formulae - Normal Forms - Principles of Normal Forms - Theory of Inference, simple problems.

UNIT-III:

Finite Automata - Definition of an Automaton- Representation of Finite Automaton-Acceptability of a string by a Finite Automaton - Languages accepted by a Finite automaton – Nondeterministic Finite automata - Acceptability of a string by Nondeterministic Finite Automata.

UNIT-IV:

Equivalence of FA and NFA- Procedure for finding an FA equivalent to a given NFA - Phrase - structure Grammars.

UNIT-V:

Pushdown Automata-Definition of a Pushdown Automaton – Instantaneous Descriptions of a PDA- Important properties of move relation - Acceptance by PDA – Equivalence of two types of Acceptance by PDA.

TEXT BOOK:

1. Discrete Mathematics -Venkatraman M.K, Sridharan.N, Chandrasekaran.N, The National Publishing Company, Chennai, 2000.

Unit 1: Chapter 1: sec -1 to 4, 6 to 8, Chapter 2: sec -1 to 5, 7 , Chapter 3: sec -1 to 5,

Unit 2: Chapter 9: sec -1 to 4, 6 to 8, 11 to 13,

Unit 3: Chapter 12: sec -1 to 8,

Unit 4: Chapter 12 sec -9,10,16,

Unit 5: Chapter 12: sec -23 to 28.

REFERENCE BOOKS:

1. Theory of Computer Science- K.L.P Mishra and N. Chandrasekaran ,Prentice Hall of India, Pvt Ltd.
2. Discrete Mathematical Structures applications toComputerScience, Trembly &Manohar, Tata McGraw.
3. Introduction to Automata Theory, Languages and Computions, Hopcraft and Ullman, 2nd Edition, Pearson Education.
4. Discrete Mathematical Structures with Applications to Combinatorics,Ramaswamy V, UnivPress, 2006.
5. Veerarajan T, “Discrete Mathematics with graph theory and combinatorics”, TMG, 2007.