ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

CUDDALORE-1

PG & RESEARCH DEPARTMENT OF MATHEMATICS

M.Sc. MATHEMATICS

SYLLABUS (2016-2017)

CURRICULUM TEMPLATE

Yr/ Sem	Subject		Paper	Title of the paper	Hrs	Credits
I YEAR / I SEM	Core	PMT701	I	**ALGEBRA I**	6	5
	Core	PMT702S	II	**REAL ANALYSIS I**	6	5
	Core	PMT703	III	**ORDINARY DIFFERENTIAL EQUATIONS**	6	4
	Core	PMT704S	IV	**CLASSICAL MECHANICS**	6	4
	Elective-I	EPMT705T & EPMT705A	V	**MATHEMATICAL PROGRAMMING / APPLIED ABSTRACT ALGEBRA**	6	4
I YEAR / II SEM	Core	PMT806S	VI	**ALGEBRA II**	6	5
	Core	PMT807	VII	**MEASURE THEORY**	6	5
	Core	PMT808S	VIII	**NUMERICAL ANALYSIS**	6	4
	Core	PMT809T	IX	**FLUID DYNAMICS**	6	4
	Elective-II	EPMT810T & EPMT810A	X	**OPERATIONS RESEARCH/ / SPECIAL FUNCTIONS**	6	4
I I YEAR / III SEM	Core	PMT911	XI	**COMPLEX ANALYSIS-I**	6	5
	Core	PMT912S	XII	**TOPOLOGY**	6	5
	Core	PMT913	XIII	**DIFFERENTIAL GEOMENTRY**	6	5
	Core	PMT914T	XIV	**STOCHASTIC PROCESS**	5	3
	Elective-III	EPMT915 & EPMT915A	XV	**FUZZY SUBSETS AND ITS APPLICATION / INTEGRAL TRANSFORMS**	5	3
	Compulsory	ECHR901S	XVI	**HUMAN RIGHTS**	2	2
I I YEAR / IV SEM	Core	PMT1016	XVII	**COMPLEX ANALYSIS-II**	6	5
	Core	PMT1017	XVIII	**FUNCTIONAL ANALYSIS**	6	5
	Core	JPMT1018	XIX	**PROJECT**	6	5
	Core	PMT1019T	XX	**PARTIAL DIFFERENTIAL EQUATIONS**	6	4
	Elective-IV	EPM1020 & EPM1020A	XXI	**GRAPH THEORY / FORMAL LANGUAGES AND AUTOMATA THEORY**	6	4

I – M.Sc (Maths)	ALGEBRA – I For the students admitted from the year 2009	PMT701
SEMESTER – I		HRS/WK - 6
CORE – 1		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

UNIT-I

Another counting principle.

UNIT-II

Sylow's Theorem

UNIT-III

Direct Products, Finite Abelian groups, Modules.

UNIT-IV

Canonical Forms: Triangular forms, Nilpotent Transformations, A Decomposition of V, Jordan form

UNIT-V

Rational Canonical Form, Trace and Transpose,

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: 2.13, 2.14, 4.5
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.SIuther 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 AbstractAigebra, McGraw Hill [International Edition], New York. 3997.
5. N.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 – 2		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.

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 -Stieftjes 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)		PMT703
SEMESTER – I	ORDINARY DIFFERENTIAL EQUATIONS	HRS/WK – 6
CORE – 3	For the students admitted from the year 2009	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.

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:
Contents and Treatment as in "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-4i-[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 aand H.I.Freedman, Narosa Publishing House, New Dehi,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)		PMT704S
SEMESTER - I	CLASSICAL MECHANICS	HRS/WK – 6
CORE – 4	For the students admitted from the year 2011	CREDIT – 4

OBJECTIVES

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

UNIT-I: MECHANICAL SYSTEMS

The Mechanical system - Generalised 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.CRane 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)		EPMT705T
SEMESTER – I	MATHEMATICAL PROGRAMMING	HRS/WK – 6
ELECTIVE – 1	For the students admitted from the year 2014	CREDIT – 4

OBJECTIVES

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

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:

J.K.Sharma, Operations Research , Macmillan [India] New Delhi 2001
Unit 1 – Chapte 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. Tana, 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)	NUMBER THEORY AND CRYPTOGRAPHY For the students admitted from the year 2017	EPMT705A
SEMESTER - II		HRS/WK – 6
ELECTIVE-I (OPTIONAL)		CREDIT – 4

OBJECTIVES:

The Course aims to introduce the arithmetic topics, both ancient and very modern, which have been at the center of interest in applications, especially in cryptography.

UNIT- I : SOME TOPICS IN ELEMENTARY NUMBER THEORY

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

UNIT - II. FINITE FIELDS AND QUADRATIC RESIDUES

Finite fields- Quadratic residues and reciprocity

UNIT- III. CRYPTOGRAPHY

Some simple cryptosystems - Enciphering matrices

UNIT- IV. PUBLIC KEY

The idea of public key cryptography - RSA - Discrete log - Knapsack –

UNIT- V. PRIMALITY AND FACTORING

Pseudo primes - The rho method - Fermat factorization and factor bases

TEXTBOOK

N. Koblitz: A course in number theory and cryptography, GTM, Springer.

REFERENCE BOOKS

1. S. C. Coutinho: The Mathematics of Ciphers, A. K. Peters.
2. D. Welch: Codes and Cryptography.
3. W. Stallings: Cryptography and Network Security.

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.

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:

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,

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

OBJECTIVES

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

UNIT-I

Extension Fields (Finite Extension, Algebraic Extension and Algebraic Number).

UNIT-II

Roots of Polynomials (Reminder theorem, Factor theorem and isomorphism between F[x] and F'[t]).

UNIT-III

More about roots-Elements of Galois theory,

UNIT-IV

Solvability by radicals - Wedderburn's theorem on finite division rings.

UNIT-V

Integral Quaternions and the Four - Square theorem-Division Algebra

TEXT BOOK:

I.N. Herstein. Topics in Aigebra [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.KJain, and S.R.NagpauI, Basic Abstract Aigebra [11 Edition] CambridgeUniversity Press, 1997. [Indian Edition]
3.I.S.Luther and LB.S.Passi, Aigebra, 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 Aigebrar McGraw Hill [International Edition], New York. 1997.

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

OBJECTIVE:
1. To generalize the concept of integration using measures.
2. To develop the concept of analysis in abstract situations.

UNIT 1-LEBESGUE MEASURE
Outer measure–Definition & properties–Lebesgue measure-measurable sets-properties-non-measurable-set-measurable functions-Little wood's three principle.

UNIT 2-LEBESGUE INTEGRAL
Lebesgue Integral of simple function bounded measurable function –of a non-negative function-Fatou's lemma-monotone convergence therorem-General Lebesgue integral –Lebesgue convergence in measure.

UNIT 3-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 4-GENERAL MEASURE AND INTEGRATION
Measure spaces –Measurable functions –Integration-Signed measure –Hahn decomposition theorem.

UNIT 5-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 to 6
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)		PMT808S
SEMESTER – II	NUMERICAL ANALYSIS	HRS/WK – 6
CORE – 7	For the students admitted from the year 2014	CREDIT – 4

OBJECTIVES

This courses introduces a numerical methods for hands-on experience on computers.

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 INTGRATIOM:

Newton – Cotes Formulae, Eulers- Maclurin 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 BOOKS:

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

REFERENCE BOOK:

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)	FLUID DYNAMICS For the students admitted from the year 2012	PMT809T
SEMESTER – II		HRS/WK – 6
CORE – VIII		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.

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- 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 – Discussion of the case of steady motion under conservative body forces.

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

UNIT – IV: SOME TWO DIMENSIONAL FLOWS:
Meaning of two dimensional flow – Use of Cyclindrical 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:
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)		EPMT810T
SEMESTER – II	**OPERATIONS RESEARCH**	HRS/WK – 6
ELECTIVE-II	**For the students admitted from the year 2014**	CREDIT – 4

OBJECTIVES:

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

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: 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	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.

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:

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.

I – MCA	DISCRETE MATHEMATICS For the students admitted from the year 2008	PCA701
SEMESTER – I		HRS/WK – 6
CORE – 1		CREDIT – 5

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 –Phase-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 a 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, University Press, 2006.
5. Veerarajan T, " Discrete Mathematics with graph theory and combinatorics" , TMG, 2007,.

I-MSC (CS)	MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE For the students admitted from the year 2011	PCS701S
SEMESTER – I		HRS/WK - 6
CORE – 1		CREDIT - 5

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 –Phase-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 a AcceptancebyPDA

Text Book:
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,RamaswamyV, UnivPress, 2006.
5. Veerarajan T, " Discrete Mathematics with graph theory and combinatorics" , TMG, 2007.

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

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 HARMONIC FUNCTION

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

TEXT BOOK:

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, " Comples function Theory, Academic Press, New York, 1968.

II – M.Sc (Maths)	TOPOLOGY	PMT912S
SEMESTER – III	For the students admitted from the year 2014-15	HRS/WK – 6
CORE – XI		CREDIT – 5

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

UNIT-1 **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
GEORGE F. SIMMONS, Introduction to Topology & Modern Analysis Mc Graw Hill Internatinal Edition , New York-1963
Unit 1 chapt 2; sec 9 to 15 , Unit 2 chapt3; sec 16 to 20 , Unit 3 chapt 4 ; sec 21 to 25
Unit 4 chapt 5; sec 26 to 30 ,Unit 5 chapt 6; sec 31 to 34, chapt 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. 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** **For the students admitted form the year 2015**	**PMT913S**
SEMESTER – IV		**HRS/WK – 6**
CORE – VI		**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.

UNIT – I: SPACE CURVES:

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

UNIT- II: SPACE CURVES [Contd]

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[Contd]:

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

UNIT - IV: GEODESICS: Geodesics – Canonical geodesic equations – Normal property of geodesics – 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:

T.J. Wilmore, An Introduction of Differential Geometry, OxfordUniversity
Press,(17^{th} Impression) New Delhi 2002. (Indian Print)
Unit 1 Chapter I: Sections 1 to 7. ,
Unit 2 Chapter I: Section 8 & 9 Chapter II: Sections 1 to 3
Unit 3 Chapter II: Sections 4 to 9, Unit 4 Chapter II: Sections10 to 16 ,
Unit 5 Chapter III: Sections 1 to 6

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., MeerutCity
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)		**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.

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 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) Acadamic 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:

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

II – M.Sc (Maths)	**INTEGRAL TRANSFORMS** **For the students admitted from the year 2017**	EPMT915A
SEMESTER – IV		**HRS/WK – 6**
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.

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:

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

REFERENCE BOOK:

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

II – M.Sc (Maths)	COMPLEX ANALYSIS-II For the students admitted from the year 2008	PMT1016
SEMESTER – IV		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

UNIT-I POWER SERIES EXPANSIONS:

Weierstrass's Theorem, The Taylor Series, 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, Normality 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 Weierstras Theory: The Weierstras -function, The Functions (z) and (z),The Differential Equation.

TEXT BOOK:

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, 1968.

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

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 (CONTD):

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:

G.F. SIMMONS,"Introduction to TOPOLOGY AND MODERN ANALYSIS", Mc Graw 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 Delh.

II – M.Sc (Maths)		PMT1019T
SEMESTER - IV	PARTIAL DIFFERENTIAL EQUATIONS	HRS/WK – 6
CORE – XX	For the students admitted from the year 2017	CREDIT – 4

UNIT – 1: 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:

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

REFERENCES BOOK:

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)		EPM1020
SEMESTER - IV	GRAPH THEORY	HRS/WK – 6
Elective - IV	For the student admitted from the year 2012	CREDIT – 4

UNIT-I GRAPHS & SUBGRAPHS

Paths&Connection-cycles.
Application: The Shortest Path Problem-Sparner's lemma.

UNIT-II TREES & CONNECTIVITY

Trees-cut edges and bonds-cut vertices-Cayles's formula.
Application: The connector Problem
Connectivity: Connectivity-Blocks
Applications: Constructions of Reliable communication networks.

UNIT-III EULER TOURS&HAMILTONIAN CYCLES

Euler Tours & Hamiltonian Cycles
Application: The Chinese postmanProblem –The travelling sales man problem.

UNIT-IV DGE COLOURINGS&INDEPENDENT SETS

Edge chromatic number-vizings theorem, Independent sets-Ramsey's theorem.
Application: The time tabling Problem.

UNIT-V VERTEX COLOURINGS

Chromatic number-Brooke's theorem-Hajose' conjuncture-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 chapt 1 Sections 1.6, 1.7, 1.8,1.9
Unit 2 chapt 2 Sections – 2.1, 2.2, 2.3, 2.4, 2.5, chapt 3; 3.1, 3.2, 3.3
Unit 3 chapt 4; Sections –4.1, 4.2,4.3,4.4
Unit 4 chapt 6; Sections –6.1, 6.2, 6.3, 7.1, 7.2,
Unit 5;chapt 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, AText book of graph theory,Springer 2000.
2. F.Harary, Graph theory-Addison Wesley, 1969.

II – M.Sc (Maths)	**FORMAL LANGUAGES AND AUTOMATA THEORY For the students admitted from the year 2017**	EPM1020A
SEMESTER - IV		**HRS/WK – 6**
ELECTIVE		**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

UNIT-1 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. [18 HRS]

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.

Sections:2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 3.1, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 5.2, 5.3, 6.1, 6.2
Omit 3.2, 3.3, 3.4, and 6.3

TEXT BOOK

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 (2^{nd} Edition) Tata-McGraw HillCompany Ltd, New Delhi, 1999
2.A.Salomaa, Formal Languages, Academic Press, New York, 1973.

QUESTION PATTERN

Time: 3Hrs
Max. Marks:75

Section – A
5x2=10
Answer ALL Questions

Section – B
3x5=15
Answer any THREE Questions (Out of five)

Section – C
5x10=50
Answer ALL Questions (Either or Type)