C. ABDUL HAKEEM COLLEGE

Melvisharam, Vellore Dist- 632509, TN, India

Telephone : +91 4172 266487, 266987 | **Fax :** +91 4172 266587

Web : www.hakeemcollege.com

SUBJECT LIST

Course M.Sc - Mathematics

Batch 2015-2016

Total Credits 90

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
Semester - 1					**Subject Count - 5**			**Total Credits - 21**				
1	E	Theory	Main	P15MMA101	Algebra - I	25	0	75	38	50	5	III
2	E	Theory	Main	P15MMA102	Real Analysis - I	25	0	75	38	50	5	III
3	E	Theory	Main	P15MMA103	Ordinary Differential Equations	25	0	75	38	50	4	III
4	E	Theory	Main	P15MMA104	Mathematical Programming	25	0	75	38	50	4	III
5	E	Theory	Elective	P15EMA101	Fuzzy Mathematics (Elective)	25	0	75	38	50	3	III
Semester - 2					**Subject Count - 6**			**Total Credits - 23**				
1	E	Theory	Main	P15MMA201	Algebra - II	25	0	75	38	50	5	III
2	E	Theory	Main	P15MMA202	Real Analysis - II	25	0	75	38	50	5	III
3	E	Theory	Main	P15MMA203	Partial Differential Equations	25	0	75	38	50	4	III
4	E	Theory	Main	P15MMA204	Operations Research	25	0	75	38	50	4	III
5	E	Theory	Elective	P15EMA201	Difference Equations (Elective)	25	0	75	38	50	3	III
6	E	Theory	Main	P15CHR201	Human Rights	25	0	75	38	50	2	VII

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SUBJECT LIST

Course M.Sc - Mathematics

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Total Credits 90

S.No	E/D	Cate.	Type	S. Code	S. Name	I.Ma	I.Mi	E.Ma	E.Mi	P M	Cr	Pt
Semester - 3					**Subject Count - 6**			**Total Credits - 23**				
1	E	Theory	Main	P15MMA301	Complex Analysis - I	25	0	75	38	50	4	III
2	E	Theory	Main	P15MMA302	Topology	25	0	75	38	50	5	III
3	E	Theory	Main	P15MMA303	Differential Geometry	25	0	75	38	50	4	III
4	E	Theory	Main	P15MMA304	Mechanics	25	0	75	38	50	5	III
5	E	Theory	Elective	P15EMA301	Probability Theory (Elective)	25	0	75	38	50	3	III
6	E	Practical	Main	P15MMAP31	Practical - Mathematical Software - Latex	40	0	60	30	40	2	III
Semester - 4					**Subject Count - 5**			**Total Credits - 23**				
1	E	Theory	Main	P15MMA401	Complex Analysis - II	25	0	75	38	50	5	III
2	E	Theory	Main	P15MMA402	Functional Analysis	25	0	75	38	50	5	III
3	E	Theory	Main	P15MMA403	Mathematical Statistics	25	0	75	38	50	5	III
4	E	Theory	Main	P15MMA404	Number Theory and Cryptography	25	0	75	38	50	5	III
5	E	Theory	Elective	P15EMA401	Fluid Dynamics (Elective)	25	0	75	38	50	3	III

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA101	Semester :	I
Major - 1	Title:	**Algebra - I**			
Credits:	5			Max. Marks. 75	

UNIT-I

Another Counting Principle - class equation for finite groups and its applications - Sylow's theorems (For theorem 2.12.1, Only First proof).

Chapter 2: Sections 2.11 and 2.12 (Omit Lemma 2.12.5)

UNIT-II

Solvable groups - Direct products - Finite abelian groups- Modules .

Chapter 5 : Section 5.7 (Lemma 5.7.1, Lemma 5.7.2, Theorem 5.7.1)

Chapter 2: Sections 2.13 and 2.14 (Only Theorem 2.14.1) Chapter 4: Section 4.5

UNIT-III

Linear Transformations: Canonical forms - Triangular form - Nilpotent transformations.

Chapter 6: Sections 6.4 , 6.5

UNIT-IV

Jordan form - rational canonical form.

Chapter 6 : Sections 6.6 and 6.7

UNIT-V

Trace and transpose - Hermitian, unitary, normal transformations, real quadratic form.

Chapter 6 : Sections 6.8, 6.10 and 6.11 (Omit 6.9)

Recommended Text:

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books:

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.

2. P.B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)

3. I.S.Luther and I.B.S.Passi, *Algebra,* Vol. I –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. I & II W.H.Freeman ; also published by Hindustan Publishing Company, New Delhi, 1980.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA102	Semester :	I
Major - 2	Title:	**Real Analysis - I**			
Credits:	5			Max. Marks. 75	

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.

Chapter - 6 : Sections 6.1 to 6.8

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 - Stieltjes 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.

Chapter - 7 : Sections 7.1 to 7.13

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-Stieltjes 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-Riemann-Stieltjes integrals depending on a parameter-Differentiation under the integral sign.

Chapter - 7 : 7.15 to 7.25

UNIT-IV : INFINITE SERIES AND INFINITE PRODUCTS

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 - Infinite products.

Chapter 8 : Sections 8.8, 8.15, 8.17, 8.18, 8.20, 8.21 to 8.26

UNIT-V: SEQUENCES OF FUNCTIONS

Pointwise 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 -

Uniform convergence and differentiation - Sufficient condition for uniform convergence of a series - Mean convergence.
Chapter - 9 Sec 9.1 to 9.6, 9.8, 9.10,9.11, 9.13

Recommended Text:

Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1997.

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.

3. Malik,S.C. and Savita Arora. *Mathematical Anslysis*, Wiley Eastern Limited.New Delhi, 1991.

4. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991.

5. A.L.Gupta and N.R.Gupta, *Principles of Real Analysis*, Pearson Education, (Indian print) 2003.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA103	Semester :	I
Major - 3	Title:	**Ordinary Differential Equations**			
Credits:	4			Max. Marks. 75	

UNIT-I : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Second order homogeneous equations-Initial value problems-Linear dependence and independence - Wronskian and a formula for Wronskian -Non-homogeneous equation of order two.

Chapter - 2 : Sections 1 to 6

UNIT-II : LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

Homogeneous and non-homogeneous equation of order n - Initial value problems-Annihilator method to solve non-homogeneous equation - Algebra of constant coefficient operators.

Chapter - 2 : Sections 7 to 12.

UNIT-III : LINEAR EQUATION WITH VARIABLE COEFFICIENTS

Initial value problems - Existence and uniqueness theorems - Solutions to solve a non-homogeneous equation - Wronskian and linear dependence - reduction of the order of a homogeneous equation - homogeneous equation with analytic coefficients -The Legendre equation.

Chapter - 3 Sections 1 to 8 (Omit section 9)

UNIT-IV : LINEAR EQUATION WITH REGULAR SINGULAR POINTS

Euler equation - Second order equations with regular singular points -Exceptional cases - Bessel Function.

Chapter 4 : Sections 1 to 4 and 6 to 8 (Omit sections 5 and 9)

UNIT-V: **EXISTENCE AND UNIQUENESS OF SOLUTIONS TO FIRST ORDER EQUATIONS**

Equation with variable separated - Exact equation - method of successive approximations - the Lipschitz condition - convergence of the successive approximations and the existence theorem.

Chapter 5 : Sections 1 to 6 (Omit Sections 7 to 9)

Recommended Text:

E.A.Coddington, *An introduction to ordinary differential equations* (3rd Reprint) Prentice-Hall of India Ltd.,New Delhi, 1987.

Reference Books:

1. Williams E. Boyce and Richard C. DI Prima, *Elementary differential equations and boundary value problems*, John Wiley and sons, New York, 1967.

2. George F Simmons, *Differential equations with applications and historical notes*, Tata McGraw Hill, New Delhi, 1974.

3. N.N. Lebedev, *Special functions and their applications*, Prentice Hall of India, New Delhi, 1965.

4. W.T. Reid. *Ordinary Differential Equations*, John Wiley and Sons, New York, 1971

5. M.D.Raisinghania, *Advanced Differential Equations*, S.Chand & Company Ltd. New Delhi 2001

6. B.Rai, D.P.Choudary and H.I. Freedman, *A Course in Ordinary Differential Equations*, Narosa Publishing House, New Delhi, 2002.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA104	Semester :	I
Major - 4	Title:	**Mathematical Programming**			
Credits:	4			Max. Marks. 75	

UNIT-I

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

DYNAMIC PROGRAMMING: Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

Chapter-7: 7.1 - 7.6 and Chapter-20: 20.1 - 20.5

UNIT-II

CLASSICAL OPTIMIZATION METHODS : Unconstrained Optimization - Constrained Multi-variable Optimization with Equality Constraints - Constrained Multi-variable Optimization with inequality Constraints.

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

Chapter-23: 23.1 - 23.4 and Chapter-24: 24.1 - 24.4

UNIT-III : 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 - Optimality conditions - Some complications and their resolutions - Degeneracy and its resolution

Chapter-25: 25.1 - 25.4, 25.6-25.9

UNIT-IV

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

BOUNDED VARIABLES LP PROBLEM: The simplex algorithm

Chapter-26: 26.1 - 26.4

Chapter-28: 28.1, 28.2

UNIT-V

PARAMETRIC LINEAR PROGRAMMING : Variation in the coefficients c_j , Variations in the Right hand side, b_i .

GOAL PROGRAMMING : Difference between LP and GP approach - Concept of Goal Programming - Goal Programming Model formulation - Graphical Solution Method of Goal Programming - Modified Simplex method of Goal Programming.

Chapter-29: 29.1 - 29.3.

Chapter-8: 8.1 - 8.4, 8.6 and 8.7.

Recommended Text:

J. K. Sharma, *Operations Research*, Theory and Applications, Third Edition (2007) Macmillan India Ltd.

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 ompany, 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

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15EMA101	Semester :	I
Elective -1	Title:	**Fuzzy Mathematics**			
Credits:	3			Max. Marks. 75	

UNIT - I : FUZZY SETS

Fuzzy sets – Basic Types – Basic concepts – Characteristics – Significance of the paradigm shift – Additional properties of α – cuts.

Chapter 1 : Sections 1.3 to 1.5 and Chapter 2 : Section 2.1

UNIT - II : FUZZY SETS VERSUS CRISP SETS

Representation of Fuzzy sets – Extension principle of Fuzzy sets – Operation on Fuzzy sets – Types of operation – Fuzzy complements.

Chapter 2 : Sections 2.2 and 2.3 and Chapter 3 : Sections 3.1 and 3.2

UNIT - III : OPERATIONS ON FUZZY SETS

Fuzzy intersection – t-norms – Fuzzy unions – t-conorms – Combinations of operations- Aggregation operations.

Chapter 3 : Sections 3.3 to 3.6

UNIT - IV : FUZZY ARITHMETIC

Fuzzy number – Linguistic variables – Arithmetic operation on intervals – Lattice of Fuzzy numbers.

Chapter 4 : Sections 4.1 to 4.4

UNIT - V : CONSTRUCTING FUZZY SETS

Methods of construction : An overview – Direct methods with one expert – Direct method with multiple experts – Indirect method with multiple experts and one expert – Construction from sample data.

Chapter 10 : Sections 10.1 to 10.7

Recommended Text:

G. J. Klir and Bo Yuan, *Fuzzy Sets and Fuzzy Logic : Theory and Applications*, PHI, New Delhi, 2005.

Reference Books:

1. H. J. Zimmerman, *Fuzzy Set Theory and its Applications*, Allied Publishers, 1996.
2. A. Kaufman, Introduction to the theory of Fuzzy Subsets, Academic Press, 1975.
3. V. Novak, Fuzzy Sets and their Applications, Adam Hilger, Bristol, 1969.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA201	Semester :	II
Major - 5	Title:	**Algebra - II**			
Credits:	4			Max. Marks. 75	

UNIT-I

Extension fields - Transcendence of e.
Chapter 5: Section 5.1 and 5.2

UNIT-II

Roots or Polynomials.- More about roots
Chapter 5: Sections 5.3 and 5.5

UNIT-III

Elements of Galois theory.
Chapter 5 : Section 5.6

UNIT-IV

Finite fields - Wedderburn's theorem on finite division rings.
Chapter 7: Sections 7.1 and 7.2 (Only Theorem 7.2.1)

UNIT-V

Solvability by radicals - A theorem of Frobenius - Integral Quaternions and the Four - Square theorem.
Chapter 5: Section 5.7 (omit Lemma 5.7.1, Lemma 5.7.2 and Theorem 5.7.1) Chapter 7 : Sections 7.3 and 7.4

Recommended Text:

I.N. Herstein. *Topics in Algebra* (II Edition) Wiley Eastern Limited, New Delhi, 1975.

Reference Books:

1. M.Artin, *Algebra,* Prentice Hall of India, 1991.

2. B.Bhattacharya, S.K.Jain, and S.R.Nagpaul, *Basic Abstract Algebra* (II Edition) Cambridge University Press, 1997. (Indian Edition)

3. I.S.Luther and I.B.S.Passi, *Algebra,* Vol. I - 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. I & II Hindustan Publishing Company, New Delhi.

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Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA202	Semester :	II
Major - 6	Title:	**Real Analysis - II**			
Credits:	5			Max. Marks. 75	

UNIT - I : FOURIER SERIES AND FOURIER INTEGRALS

Introduction - Orthogonal system of functions - The theorem on best approximation - The Fourier series of a function relative to an orthonormal system - Properties of Fourier Coefficients - The Riesz-Fischer Thorem - The convergence and representation problems in trigonometric series - The Riemann Lebesgue Lemma - The Dirichlet Integrals - An integral representation for the partial sums of Fourier series - Riemann's localization theorem - Sufficient conditions for convergence of a Fourier series at a particular point - Cesaro summability of Fourier series- Consequences of Fejer's theorem - The Weierstrass approximation theorem

Chapter 11 : Sections 11.1 to 11.15 (Apostol)

UNIT - II : MULTIVARIABLE DIFFERENTIAL CALCULUS

Introduction - The Directional derivative - Directional derivative and continuity - The total derivative - The total derivative expressed in terms of partial derivatives - The matrix of linear function - The Jacobian matrix - The chain rule - Matrix form of chain rule - The mean - value theorem for differentiable functions - A sufficient condition for differentiability - A sufficient condition for equality of mixed partial derivatives - Taylor's theorem for functions of R_n to R_1

Chapter 12 : Section 12.1 to 12.14 (Apostol)

UNIT - III : IMPLICIT FUNCTIONS AND EXTREMUM PROBLEMS

Functions with non-zero Jacobian determinants - The inverse function theorem -The Implicit function theorem - Extrema of real valued functions of severable variables - Extremum problems with side conditions.

Chapter 13 : Sections 13.1 to 13.7 (Apostol)

UNIT - IV THE LEBESGUE INTEGRAL

Length of open sets and closed sets - Inner and outer measure : Measurable sets - Properties of measurable sets - Measurable functions - Definition and existence of the Lebesgue integral for bounded function.

Chapter 11 : Section 11.1 to 11.5 [R. R. Goldberg]

UNIT - V THE LEBESGUE INTEGRAL (Contd . . .)

Properties of the Lebesgue integral for bounded measurable functions - The Lebesque integral for unbounded functions - Some fundamental theorems - The metric space L^2 [a, b] - The integral on $(-\infty, \infty)$.

Chapter 11 : Section 11.6 to 11.10 [R. R. Goldberg]

Recommended Texts:

1. Tom M. Apostol : *Mathematical Analysis*, 2nd Edition, Addison-Wesley Publishing Company Inc. New York, 1974. (for Units I, II and III)

2. Richard R. Goldberg, Methods f Real Analysis, Oxford & IBH Publishing, New Delhi, 1975. (for Unit IV and V)

Reference Books:

1. Burkill,J.C. *The Lebesgue Integral*, Cambridge University Press, 1951.

2. Munroe,M.E. *Measure and Integration*. Addison-Wesley, Mass.1971.

3. Roydon,H.L.*Real Analysis*, Macmillan Pub. Company, New York, 1988.

4. Rudin, W. *Principles of Mathematical Analysis*, McGraw Hill Company, New York,1979.

5. Malik,S.C. and Savita Arora. *Mathematical Analysis*, Wiley Eastern Limited. New Delhi, 1991.

6. Sanjay Arora and Bansi Lal, *Introduction to Real Analysis*, Satya Prakashan, New Delhi, 1991

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Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA203	Semester :	II
Major - 7	Title:	**Partial Differential Equations**			
Credits:	5			Max. Marks. 75	

UNIT - I : PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER

Formation and solution of PDE- Integral surfaces - Cauchy Problem order equation - Orthogonal surfaces - First order non-linear - Characteristics - Compatible system - Charpits method.

Chapter 0: 0.4 to 0.11 (omit 0.1, 0.2, 0.3 and 0.11.1)

UNIT - II : FUNDAMENTALS

Intrduction-Classification of Second order PDE-Canonical forms-Adjoint operators-Riemans method.

Introduction – Classification of Second Order PDE - Canonical forms – Adjoint Operators _ Riemann's method.

Chapter 1 : 1.1 to 1.5

UNIT - III : ELLIPTIC DIFFERENTIAL EQUATIONS

Derivation of Laplace and Poisson equation - BVP - Separation of Variables - Dirichlet's Problem and Newmann Problem for a rectangle - Solution of Laplace equation in Cylindrical and spherical coordinates - Examples.

Chapter 2 : 2.1, 2 2 , 2.5 to 2.7, 2.10 to 2.13 (omit 2.3, 2.4, 2.8 and 2.9)

UNIT - IV : PARABOLIC DIFFERENTIAL EQUATIONS

Formation and solution of Diffusion equation - Dirac-Delta function - Separation of variables method - Solution of Diffusion Equation in Cylindrical and spherical coordinates - Examples.

Chapter 3 : 3.1 to 3.7 and 3.9 (omit 3.8)

UNIT - V : HYPERBOLIC DIFFERENTIAL EQUATIONS

Formation and solution of one-dimensional wave equation - canocical reduction - IVP-d'Alembert's solution - IVP and BVP for two-dimensional wave equation - Periodic solution of one-dimensional wave equation in cylindrical and spherical coordinate Systems - Uniqueness of the solution for the wave equation - Duhamel's Principle - Examples.

Chapter 4: 4.1 to 4.12 (omit 4.5, 4.6 & 4.10)

Recommended Text:

K. Sankar Rao, *Introduction to Partial Differential Equations*, 2nd Edition, Prentice Hall of India, New Delhi. 2005

Reference Books:

1. R.C.McOwen, *Partial Differential Equations*, 2nd Edn. Pearson Eduction, New Delhi, 2005.

2. I.N.Sneddon, *Elements of Partial Differential Equations*, McGraw Hill, New Delhi, 1983.

3. R. Dennemeyer, *Introduction to Partial Differential Equations and Boundary Value Problems,* McGraw Hill, New York, 1968.

4. M.D.Raisinghania, *Advanced Differential Equations,* S.Chand & Company L td., New Delhi, 2001.

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Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year:	I Year	Subject Code :	P15MMA204	Semester :	II
Major - 8	Title:	**Operations Research**			
Credits:	4			Max. Marks. 75	

UNIT-I : DECISION THEORY

Steps in Decision theory Approach - Types of Decision-Making Environments - Decision Making Under Uncertainty - Decision Making under Risk - Posterior Probabilities and Bayesian Analysis - Decision Tree Analysis - Decision Making with Utilities.

Chapter-11 : 11.1 - 11.8

UNIT-II : PROJECT MANAGEMENT : PERT AND CPM

Basic Differences 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.

Chapter-13 : 13.1 - 13.7

UNIT-III : DETERMINISTIC INVENTORY CONTROL MODELS

Meaning of Inventory Control - Functional Classification - Advantage of Carrying Inventory - Features of Inventory System - Inventory Model building - Deterministic Inventory Models with no shortage - Deterministic Inventory with Shortages

Chapter-14 : 14.1 - 14.8

UNIT-IV : QUEUEING THEORY

Essential Features of Queueing System - Operating Characteristic of Queueing System - Probabilistic Distribution in Queueing Systems - Classification of Queueing Models - Solution of Queueing Models - Probability Distribution of Arrivals and Departures – Multi Phase service Queueing Model.

Chapter-16 : 16.1 - 16.9 ; Appendix 16.A , 16.B (PP 774-781)

UNIT-V : INFORMATION THEORY

Communication processes – measure of information – measures of other information quantities – channel capacity, efficiency and redundancy – encoding – necessary and sufficient condition for noise less encoding.

Chapter – 21 : 21.1 – 21.8.

Recommended Text:

J. K. Sharma, *Operations Research* Theory and Applications, Third Edition (2007), Macmillan India Ltd.

Reference Books:

1. F.S. Hillier and J.Lieberman -,*Introduction to Operations Research* (8th Edition), Tata McGraw Hill Publishing Company, New Delhi, 2006.

2. Beightler. C, D.Phillips, B. Wilde, *Foundations of Optimization* (2nd Edition) Prentice Hall Pvt Ltd., New York, 1979

3. Bazaraa, M.S; J.J.Jarvis, H.D.Sharall, *Linear Programming and Network flow*, John Wiley and sons, New York 1990.

4. Gross, D and C.M.Harris, *Fundamentals of Queueing Theory*, (3rd Edition), Wiley and Sons, New York, 1998.

5. Hamdy A. Taha , *Operations Research* (sixth edition), Prentice - Hall of India Private Limited, New Delhi.

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Syllabus for M.Sc., Mathematics effective from the year 2015-2016

Year: I Year Subject Code : P15EMA201 Semester : II

Elective - 2 Title: **Difference Equations (Elective)**

Credits: 3 Max. Marks. 75

UNIT-I : LINEAR DIFFERENCE EQUATIONS OF HIGHER ORDER

Difference Calculus - General Theory of Linear Difference Equations - Linear Homogeneous Equations with Constant coefficients - Linear non-homogeneous equations - Method of Undetermined coefficients, the method of variation of constants - Limiting behavior of solutions.

Chapter 2: Sections 2.1 to 2.5

UNIT-II : SYSTEM OF DIFFERENCE EQUATIONS

Autonomous System - The Basic Theory - The Jordan form - Linear periodic system.

Chapter 3: Section 3.1 to 3.4

UNIT-III : THE Z-TRANSFORM METHOD

Definition, Example and properties of Z-transform - The Inverse Z-transform and solution of Difference Equations: Power series method, partial fraction method, the inverse integral method - Volterra Difference Equation of convolution types - Volterra systems.

Chapter 5: Sections 5.1 to 5.3, 5.5 (omit 5.4)

UNIT-IV : ASYMPTOTIC BEHAVIOUR OF DIFFERENCE EQUATION

Tools and Approximations - Poincare's Theorem - Second order difference equations - Asymptotic diagonal systems - Higher order Difference Equations.

Chapter 8 : Sections 8.1 to 8.5

UNIT-V : OSCILLATION THEORY

Three-term difference Equation - Non-linear Difference Equations - Self-Adjoint second order equations.

Chapter 7 : Sections 7.1 to 7.3

Recommended Text:

Saber N. Elaydi, *An Introduction to Difference Equations*, Springer Verlag, New York, 1996.

Reference Books:

1. R.P.Agarwal., *Difference Equations and Inequalities*, Marcel Dekker, 1999.

2. S. Goldberg, *Introduction to Difference Equations*, Dover Publications, 1986

3. V. Lakshmi kantham and Trigiante, *Theory of Difference Equations*, Academic Press, New York, 1988.

4. Peterson, A *Difference Equations, An Introduction with Applications*, Academic Press, New York, 1991.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year: II Year Subject Code : P15MMA301 Semester : III

Major - 9 Title: **Complex Analysis - I**

Credits: 5 Max. Marks. 75

UNIT-I : CAUCHY'S INTEGRAL FORMULA

The Index of a point with respect to a closed curve - The Integral formula – Higher derivatives. Local Properties of Analytic Functions: Removable Singularities - Taylors's Theorem - Zeros and poles - The local Mapping - The Maximum Principle.
Chapter 4 : Section 2 : 2.1 to 2.3; Chapter 4 : Section 3 : 3.1 to 3.4

UNIT-II : THE GENERAL FORM OF CAUCHY'S THEOREM

Chains and cycles- Simple Continuity - Homology - The General statement of Cauchy's Theorem - Proof of Cauchy's theorem - Locally exact differentials- Multiply connected regions - Residue theorem - The argument principle.
Chapter 4 : Section 4 : 4.1 to 4.7; Chapter 4 : Section 5: 5.1 and 5.2

UNIT-III : EVALUATION OF DEFINITE INTEGRALS AND HARMONIC FUNCTIONS

Evaluation of definite integrals - Definition of Harmonic function and basic properties - Mean value property - Poisson formula.
Chapter 4 : Section 5 : 5.3 ; Chapter 4 : Sections 6 : 6.1 to 6.3

UNIT-IV : HARMONIC FUNCTIONS AND POWER SERIES EXPANSIONS

Schwarz theorem - The reflection principle - Weierstrass theorem - Taylor's Series - Laurent series .
Chapter 4 : Sections 6.4 and 6.5 ; Chapter 5 : Sections 1.1 to 1.3

UNIT-V: PARTIAL FRACTIONS AND ENTIRE FUNCTIONS

Partial fractions - Infinite products - Canonical products - Gamma Function - Jensen's formula - Hadamard's Theorem
Chapter 5 : Sections 2.1 to 2.4 ; Chapter 5 : Sections 3.1 and 3.2

Recommended Text

Lars V. Ahlfors, *Complex Analysis*, (3rd edition) McGraw Hill Co., New York, 1979

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 Thorey* (2 vols.), Gonm & Co, 1959.
4. M.Heins, *Complex function Theory*, Academic Press, New York,1968.

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Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA302	Semester :	III
Major - 10	Title:	**Topology**			
Credits:	5			Max. Marks. 75	

UNIT-I : TOPOLOGICAL SPACES

Topological spaces - Basis for a topology - The order topology - The product topology on X x Y - The subspace topology - Closed sets and limit points.

Chapter 2 : Sections 12 to 17

UNIT-II : CONTINUOUS FUNCTIONS

Continuous functions - the product topology - The metric topology.

Chapter 2 : Sections 18 to 21 (Omit Section 22)

UNIT-III : CONNECTEDNESS

Connected spaces - connected subspaces of the Real line - Components and local connectedness.

Chapter 3 : Sections 23 to 25

UNIT-IV : COMPACTNESS

Compact spaces - compact subspaces of the Real line - Limit Point Compactness - Local Compactness.

Chapter 3 : Sections 26 to 29

UNIT-V: COUNTABILITY AND SEPARATION AXIOM

The Countability Axioms - The separation Axioms - Normal spaces - The Urysohn Lemma - The Urysohn metrization Theorem - The Tietz extension theorem.

Chapter 4 : Sections 30 to 35

Recommended Text

James R. Munkres, *Topology* (2nd Edition) Pearson Education Pve. Ltd., Delhi-2002 (Third Indian Reprint)

Reference Books

1. J. Dugundji , *Topology* , Prentice Hall of India, New Delhi, 1975.

2. George F.Sinmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Book Co., 1963

3. J.L. Kelly, *General Topology*, Van Nostrand, Reinhold Co., New York

4. L.Steen and J.Subhash, Counter Examples in Topology, Holt, Rinehart and Winston, New York, 1970.

5. S.Willard, *General Topology*, Addison - Wesley, Mass., 1970

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA303	Semester :	III
Major - 11	Title:	**Differential Geometry**			
Credits:	5			Max. Marks. 75	

UNIT-I : SPACE CURVES

Definition of a space curve - Arc length - tangent - normal and binormal – curvature and torsion - contact between curves and surfaces - tangent surface - involutes and evolutes - Intrinsic equations - Fundamental Existence Theorem for space curves - Helics.

Chapter I : Sections 1 to 9

UNIT-II : INTRINSIC PROPERTIES OF A SURFACE

Definition of a surface - curves on a surface - Surface of revolution - Helicoids – Metric - Direction coefficients - families of curves - Isometric correspondence – Intrinsic properties.

Chapter II: Sections 1 to 9

UNIT-III : GEODESICS

Geodesics - Canonical geodesic equations - Normal property of geodesics – Existence Theorems - Geodesic parallels

Chapter II: Sections 10 to 14

UNIT-IV : GEODESICS (Contd . . .)

Geodesics curvature - Gauss - Bonnet Theorem - Gaussian curvature - surface of constant curvature.

Chapter II: Sections 15 to 18

UNIT-V : NON INTRINSIC PROPERTIES OF A SURFACE

The second fundamental form - Principal curvature - Lines of curvature – Developable - Developable associated with space curves and with curves on surface – Minimal surfaces - Ruled surfaces.

Chapter III: Sections 1 to 8

Recommended Text

T.J.Willmore, *An Introduction to Differential Geometry,* Oxford University Press,(17th Impression) New Delhi 2002. (Indian Print)

Reference Books

1. Struik, D.T. *Lectures on Classical Differential Geometry*, Addison - Wesley, Mass. 1950.

2. Kobayashi. S. and Nomizu. K. *Foundations of Differential Geometry,* Interscience Publishers, 1963.

3. Wilhelm Klingenberg: *A course in Differential Geometry*, Graduate Texts in Mathematics, Springer-Verlag 1978.

4. J.A. Thorpe *Elementary topics in Differential Geometry*, Under - graduate Texts in Mathematics, Springer - Verlag 1979.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA304	Semester :	III
Major - 12	Title:	**Mechanics**			
Credits:	5			Max. Marks. 75	

UNIT-I : MECHANICAL SYSTEMS

The Mechanical system - Generalised coordinates - Constraints - Virtual work – Energy and Momentum

Chapter 1 : Sections 1.1 to 1.5

UNIT-II : LAGRANGE'S EQUATIONS

Derivation of Lagrange's equations- Examples - Integrals of motion.

Chapter 2 : Sections 2.1 to 2.3 (Omit Section 2.4)

UNIT-III : HAMILTON'S EQUATIONS

Hamilton's Principle - Hamilton's Equation - Other variational principle.

Chapter 4 : Sections 4.1 to 4.3 (Omit section 4.4)

UNIT-IV : HAMILTON-JACOBI THEORY

Hamilton Principle function - Hamilton-Jacobi Equation - Separability

Chapter 5 : Sections 5.1 to 5.3

UNIT-V : CANONICAL TRANSFORMATION

Differential forms and generating functions - Special Transformations - Lagrage and Poisson brackets.

Chapter 6 : Sections 6.1, 6.2 and 6.3 (omit sections 6.4, 6.5 and 6.6)

Recommended Text

D. T. Greenwood, *Classical Dynamics*, Prentice Hall of India, New Delhi, 1985.

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, *Principles of Mechanics* (3rd Edition) McGraw Hill Book Co., New York, 1970.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15EMA301	Semester :	III
Elective - 3	Title:	**Probability Theory (Elective)**			
Credits:	3			Max. Marks. 75	

UNIT-I : RANDOM EVENTS AND RANDOM VARIABLES

Random events - Probability axioms - Combinatorial formulae - conditional probability - Bayes Theorem - Independent events - Random Variables - Distribution Function - Joint Distribution - Marginal Distribution - Conditional Distribution – Independent random variables - Functions of random variables.

Chapter 1: Sections 1.1 to 1.7

Chapter 2 : Sections 2.1 to 2.9

UNIT-II : PARAMETERS OF THE DISTRIBUTION

Expectation- Moments - The Chebyshev Inequality - Absolute moments - Order parameters - Moments of random vectors - Regression of the first and second types.

Chapter 3 : Sections 3.1 to 3.8

UNIT-III: CHARACTERISTIC FUNCTIONS

Properties of characteristic functions - Characteristic functions and moments - semiinvariants - characteristic function of the sum of the independent random variables - Determination of distribution function by the Characteristic function – Characteristic function of multidimensional random vectors - Probability generating functions.

Chapter 4 : Sections 4.1 to 4.7

UNIT-IV : SOME PROBABILITY DISTRIBUTIONS

One point , two point , Binomial - Polya - Hypergeometric - Poisson (discrete) distributions - Uniform - normal gamma - Beta - Cauchy and Laplace (continuous) distributions.

Chapter 5 : Section 5.1 to 5.10 (Omit Section 5.11)

UNIT-V: LIMIT THEOREMS

Stochastic convergence - Bernoulli law of large numbers - Convergence of sequence of distribution functions - Levy-Cramer Theorems - de Moivre-Laplace Theorem - Poisson, Chebyshev, Khintchine Weak law of large numbers - Lindberg Theorem - Lyapunov Theroem - Borel-Cantelli Lemma - Kolmogorov Inequality and Kolmogorov Strong Law of large numbers.

Chapter 6 : Sections 6.1 to 6.4, 6.6 to 6.9 , 6.11 and 6.12.

(Omit Sections 6.5, 6.10,6.13 to 6.15)

Recommended Text

M. Fisz, Probability Theory and Mathematical Statistics, John Wiley and Sons, New York, 1963.

Reference Books

1. R.B. Ash, Real Analysis and Probability, Academic Press, New York, 1972
2. K.L.Chung, A course in Probability, Academic Press, New York, 1974.
3. R.Durrett, Probability : Theory and Examples, (2nd Edition) Duxbury Press, New York, 1996.
4. V.K.Rohatgi An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi, 1988(3rd Print).
5. S.I.Resnick, A Probability Path, Birhauser, Berlin,1999.
6. B. R. Bhat, Modern Probability Theory (3rd Edition), New Age International (P)Ltd, New Delhi, 1999.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA401	Semester :	IV
Major - 13	Title:	**Complex Analysis - II**			
Credits:	5			Max. Marks. 75	

UNIT-I : RIEMANN THETA FUNCTION AND NORMAL FAMILIES

Product development - Extension of $\zeta(s)$ to the whole plane - The zeros of zeta function - Equicontinuity - Normality and compactness - Arzela's theorem - Families of analytic functions - The Classical Definition

Chapter 5 : Sections 4.1 to 4.4 ; Chapter 5 : Sections 5.1 to 5.5

UNIT-II : RIEMANN MAPPING THEOREM

Statement and Proof - Boundary Behavior - Use of the Reflection Principle.

Conformal mappings of polygons : Behavior at an angle - Schwarz-Christoffel formula - Mapping on a rectangle.

Harmonic Functions : Functions with mean value property - Harnack's principle.

Chapter 6 : Sections 1.1 to 1.3 (Omit Section1.4) ; Sections 2.1 to 2.3 (Omit section 2.4) Section 3.1 and 3.2

UNIT-III : ELLIPTIC FUNCTIONS

Simply periodic functions - Doubly periodic functions

Chapter 7 : Sections 1.1 to 1.3 ; Sections 2.1 to 2.4

UNIT-IV : WEIRSTRASS THEORY

The Weierstrass - p-function - The functions ζ (z) and - The differential equation - The modular equation - The Conformal mapping by .

Chapter 8 : Sections 1.1 to1.7

UNIT-V: ANALYTIC CONTINUATION

The Weiertrass Theory - Germs and Sheaves - Sections and Riemann surfaces - Analytic continuation along Arcs - Homotopic curves - The Monodromy Theorem - Branch points.

Chapter 7 : Sections 3.1 to 3.5

Recommended Text

Lars F. Ahlfors, *Complex Analysis,* (3rd Edition) McGraw Hill Book Company, New York, 1979.

Reference Books

1. H.A. Presfly, *Introduction to complex Analysis*, Clarendon Press, oxford, 1990.
2. J.B. Corway, *Functions of one complex variables*, Springer - Verlag, International student Edition, Narosa Publishing Co.
3. E. Hille, *Analytic function Thorey* (2 vols.), Gonm & Co, 1959.
4. M.Heins, *Complex function Theory*, Academic Press, New York,1968.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA402	Semester :	IV
Major - 14	Title:	**Functional Analysis**			
Credits:	5			Max. Marks. 75	

UNIT-I : BANACH SPACES

Definition - Some examples - Continuous Linear Transformations - The Hahn –Banach Theorem - The natural embedding of N in N**

Chapter 9 : Sections 46 to 49

UNIT-II : BANACH SPACES AND HILBERT SPACES

Open mapping theorem - conjugate of an operator - Definition and some simple properties - Orthogonal complements - Orthonormal sets

Chapter 9 : Sections 50 and 51 ; Chapter 10 : Sections 52, 53 and 54

UNIT-III : HILBERT SPACE

Conjugate space H* - Adjoint of an operator - Self-adjoint operator - Normal and Unitary Operators - Projections

Chapter 10 : Sections 55, 56,57,58 and 59

UNIT-IV : PRELIMINARIES ON BANACH ALGEBRAS

Definition and some examples - Regular and single elements - Topological divisors of zero - spectrum - the formula for the spectral radius - the radical and semi-simplicity.

Chapter 12 : Sections 64 to 69

UNIT-V: STRUCTURE OF COMMUTATIVE BANACH ALGEBRAS

Gelfand mapping - Applications of the formula $r(x) = \lim || x_n ||^{(1/n)}$ - Involutions in Banach Algebras - Gelfand-Neumark Theorem.

Chapter 13 : Sections 70 to 73

Recommended Text

G.F.Simmons , *Introduction to topology and Modern Analysis*, McGraw Hill International Book Company, New York, 1963.

Reference Books

1. W. Rudin *Functional Analysis,* Tata McGraw-Hill Publishing Company, New Delhi, 1973

2. G. Bachman & L.Narici, *Functional Analysis* Academic Press, New York, 1966.

3. H.C. Goffman and G.Fedrick, *First course in Functional Analysis*, Prentice Hall of India, New Delhi, 1987

4. E. Kreyszig *Introductory Functional Analysis with Applications*, John wiley & Sons, New York.,1978.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year: II Year Subject Code : P15MMA403 Semester : IV

Major - 15 Title: **Mathematical Statistics**

Credits: 5 Max. Marks. 100

Objectives : This course introduces sampling theory, significance tests ,estimation, testing of hypotheses, ANOVA and sequential analysis with rigorous mathematical treatment.

UNIT-I : SAMPLE MOMENTS AND THEIR FUNCTIONS

Notion of a sample and a statistic - Distribution functions of X, S^2 and (X , S^2) - X^2 distribution - Student t-distribution - Fisher's Z - distribution - Snedecor's F - distribution - Distribution of sample mean from non-normal populations.

Chapter 9 : Sections 9.1 to 9.8

UNIT-II : SIGNIFICANCE TEST

Concept of a statistical test - Parametric tests for small samples and large samples - X^2 test - Kolmogorov Theorem 10.11.1 - Smirnov Theorem 10.11.2 - Tests of Kolmogorov and Smirnov type - The Wald-Wolfovitz and Wilcoxon -Mann-Whitney tests - Independence Tests by contingency tables.

Chapter 10 : Sections 10.11; Chapter 11 : 12.1 to 12.7

UNIT-III : ESTIMATION

Preliminary notion - Consistency estimation - Unbiased estimates - Sufficiency - Efficiency - Asymptotically most efficient estimates - methods of finding estimates - confidence Interval.

Chapter 13 : Sections 13.1 to 13.8 (Omit Section 13.9)

UNIT-IV : Analysis of Variance

One way classification and two-way classification. **Hypotheses Testing:** Poser functions - OC function - Most Powerful test - Uniformly most powerful test - unbiased test.

Chapter 15 : Sections 15.1 and 15.2 (Omit Section 15.3);
Chapter 16 : Sections 16.1 to 16.5 (Omit Section 16.6 and 16.7)

UNIT-V : SEQUENTIAL ANALYSIS

SPRT - Auxiliary Theorem - Wald's fundamental identity - OC function and SPRT - E(n) and Determination of A and B - Testing a hypothesis concerning p on 0-1 distribution and m in Normal distribution.

Chapter 17 : Sections 17.1 to 17.9 (Omit Section 17.10)

Recommended Text

M. Fisz , *Probability Theory and Mathematical Statistics,* John Wiley and sons, New Your, 1963.

Reference Books

1. E.J.Dudewicz and S.N.Mishra , *Modern Mathematical Statistics*, John Wiley and Sons, New York, 1988.

2. V.K.Rohatgi *An Introduction to Probability Theory and Mathematical Statistics,* Wiley Eastern New Delhi, 1988(3rd Edn)

3. G.G.Roussas, *A First Course in Mathematical Statistics,* Addison Wesley Publishing Company, 1973

4. B.L.Vander Waerden, *Mathematical Statistics,* G.Allen & Unwin Ltd., London, 1968.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15MMA404	Semester :	IV
Major - 16	Title:	**Number Theory and Cryptography**			
Credits:	5			Max. Marks. 75	

UNIT-I : Elementary Number Theory

Time Estimates for doing arithmetic - Divisibility and Euclidean algorithm - Congruences - Applications to factoring.

Chapter-I

UNIT-II : Cryptography

Some simple crypto systems - Enciphering matrices

Chapter-III

UNIT-III : Finite Fields and quadratic Residues

Finite fields - Quadratic residues and Reciprocity

Chapter-II

UNIT-IV : Public Key Cryptography

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

Chapter-IV : Sections IV.1 to IV.4 (omit sec.5)

UNIT-V : Primality and Factoring

Pseudo primes - The rho method - Fermat factorization and factor bases - The Continued fraction method - The quadratic sieve method.

Chapter-V

Recommended Text

Neal Koblitz, *A Course in Number Theory and Cryptography*, Springer-Verlag, New York, 2002, Second Edition.

Reference Books

1. Niven and Zuckermann, *An Introduction to Theory of Numbers* (Edn. 3), Wiley Eastern Ltd., New Delhi, 1976.

2. David M.Burton, *Elementary Number Theory*, Wm C.Brown Publishers, Dubuque, Iowa, 1989.

3. K.Ireland and M.Rosen, *A Classical Introduction to Modern Number Theory*, Springer Verlag, 1972.

C. Abdul Hakeem College (Autonomous), Melvisharam.

Syllabus for M.Sc., Mathematics effective from the year 2017-2016

Year:	II Year	Subject Code :	P15EMA401	Semester :	IV
Elective - 4	Title:	**Fluid Dynamics (Elective)**			
Credits:	3			Max. Marks. 75	

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.
Chapter 2. Sections 2.1 to 2.10.

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.
Chapter 3. Sections 3.1 to 3.7

UNIT-III

Some three dimensional flows. Introduction- Sources, sinks and doublets - Images in a rigid infinite plane - Axis symmetric flows - stokes stream function
Chapter 4 Sections 4.1, 4.2, 4.3, 4.5.

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.
Chapter 5. Sections 5.1 to 5.8

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.

Chapter 8. Sections 8.1 to 8.9

Recommended Text

F. Chorlton, *Text Book of Fluid Dynamics* ,CBS Publications. Delhi ,1985.

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 Yor, 2002.
5. T.Petrila, *Basics of Fluid Mechanics and Introduction to Computational Fluid Dynamics,* Springer, berlin, 2004.