ANANDA COLLEGE, DEVAKOTTAI -630 303

II M.Sc Mathematics Syllabus for Nov 2020 Semester (III Semester)

Sem	Sub.code	Subject	Cr.	Hrs/Week	Max.Marks		
					Int	Ext	Total
III	7MMA3C2	Core–X–Topology – I	5	6	25	75	100
	7MMA3C3	Core–XI–Probability and Statistics	5	6	25	75	100
	7MMA3E1 7MMA3E2 7MMA3E3	Elective–III:(Choose One out of Three) A) Discrete Mathematics (or) B) Fluid Dynamics (or) C) Automata Theory	4	6	25	75	100
	7MMA3E4 7MMA3E5 7MMA3E6	Elective–IV:(Choose One out of Three) A) Fuzzy Mathematics (or) B) Stochastic Processes (or) C) Combinatorial Mathematics	4	6	25	75	100
	Total		23	30	--	--	500

II YEAR–III SEMESTER

COURSE CODE: 7MMA3C1

CORE COURSE-IX–COMPLEX ANALYSIS

Unit I

Concept of analytic function – Elementary theory of power series – Conformability – Linear transformations.

Unit II

Complex integration – Cauchy integral formula.

Unit III

Local properties of analytic functions.

Unit IV

Calculus of residues.

Unit V

Power series expansions – canonical products – Jensen's formula.

Text Book

Lars V.Ahlfors, Complex Analysis, 3rd edition, McGraw Hill International Book Company, 1979.

Chapter II : (Sections 1, 2)
Chapter III : (Sections 2, 3)
Chapter IV : (Sections 1, 2, 3, & 5)
Chapter V : (Sections 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 3.3).

Books for Supplementary Reading and Reference:

1. S.Ponnusamy, Foundations of Complex Analysis, Narosa Publication House, New Delhi, 2004.
2. John B.Conway, Functions of One Complex Variable, 2nd edition, Springer-Verlag, International Student Edition, Narosa Publishing Company.

COURSE CODE: 7MMA3C2

CORE COURSE-X–TOPOLOGY – I

Unit I

Topological Spaces – Basis of a topology – the order topology – the product topology on XxY– the subspace topology – closed sets and limit points.

Unit II

Continuous functions – the product topology – the metric topology – the quotient topology.

Unit III

Connected spaces – connected sets in the real line – components and path components – local connectedness.

Unit IV

Compact spaces – compact sets in the real line – limit point compactness.

Unit V

The countability axioms – the separation axioms – the Urysohn's lemma – the Uryshon's metrization theorem.

Text Book

James R.Munkres, Topology a first course, Prentice Hall of India Pvt. Ltd.,New Delhi (1987)

Chapter II : (Sections 2.1 to 2.10)
Chapter III : (Sections 3.1 to 3.4)

Chapter IV : (Sections 3.5 to 3.7)
Chapter V : (Sections 4.1 to 4.4)

Books for Supplementary Reading and Reference:

1. **James Dugundji, Topology, Prentice Hall of India, New Delhi, 1975.**
2. **George F.Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Co., 1963.**

COURSE CODE: 7MMA3C3

CORE COURSE-XI – PROBABILITY AND STATISTICS

Unit I

Probability and Distribution: Introduction – Set theory – The probability set function – Conditional probability and independence – Random variables of the discrete type – Random variables of the continuous type – properties of the distribution function – expectation of random variable – some special expectations – Chebyshev's Inequality.

Unit II

Multivariate Distributions: Distributions of two random variables – Conditional Distributions and Expectations – the correlation coefficient – Independent random variables – extension to several Random variables.

Unit III

Some special Distributions: The Binomial and Related Distributions – The Poisson Distribution– The Gamma and Chi-square Distributions – The Normal Distribution – The Bivariate Normal Distribution.

Unit IV

Distributions of functions of Random variables: Sampling Theory – Transformations of variables of the discrete type – Transformations of variables of the continuous type – the Beta, t and F distributions – Extensions of the change – of – variable Technique –Distributions of order statistics – The Moment generating – Function, Techniques – The distributions of $\bar{X}$ and ns^2/σ^2 – Expectations of functions of Random variables

Unit V

Limiting Distributions : Convergence in distribution – convergence in probability – Limiting Moment Generating Functions – The Central Limit Theorem – Some theorems on Limiting Distributions.

Text Book:

1. **Introduction to Mathematical Statistics, (Fifth edition) by Robert V.Hogg and AllenT. Craig Pearson Education Asia.**

Chapters I, II, III, IV (Omit 4.10) & V.

Books for Supplementary Reading and Reference:

1. **M.Fisz, Probability, Theory and Mathematical Statistics, John Wiley and Sons, New York. 1963.**
2. **V.K.Rohatgi, An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd., New Delhi, 1988 (3rd Print)**

COURSE CODE: 7MMA3E1

ELECTIVE COURSE-III (A) – DISCRETE MATHEMATICS

Unit I

Algebraic Systems : Binary Operation – Algebraic Systems – Semigroups and Monoids – Homorphism and Isomophism of Semigroups and Monoids – Properties of Homomorphism – Subsemi groups and Submonoids.

Unit II

Mathematical Induction – Techniques of Proof – Mathematical Induction – Recurrence Relations and Generating Functions – Recurrence – an introduction – Polynomials and their Evaluations Recurrence Relations – Solution of Finite order Homogeneous (Linear) Relations.

Unit III

Solution of Non-homogeneous Relations – Generations Functions – Some Common Recurrence Relations – Primitive Recursive Functions – Recursive and Partial Recursive Fnctions.

Unit IV

Lattices – Lattices – Some Properties of Lattices – New Lattices – Modular and Distributive Lattices.

Unit V

Boolean Algebra – Boolean Algebras – Boolean Polynomials – Karnaugh Map – Switching Circuits

Text Book:

1. **Dr. M.K.Venkataraman, Dr. N.Sridharan and Dr. N.Chandra Sekaran, The National Publishing Company, Chennai.**

   Chapter IV; Chapter V -Sections 1 to 9
   Chapter VII -Sections 7.1 to 7.6; Chapter X

Books for Supplementary Reading and Reference:

1. Rudolf Lidl and Gunter Pilz, Applied Abstract Algebra, 2nd Indian Reprint 2006, Springer Verlag, New York.

2. Kenneth H. Rosen, Discrete Mathematics and its Applications, Fourth edition, McGraw Hill Publications.
3. A.Gill, Applied Algebra for Computer Science, Prentice Hall Inc., New Jersey.

COURSE CODE: 7MMA3E2

ELECTIVE COURSE-III (B) – FLUID DYNAMICS

Unit I Kinematics of fluids in motion

Real fluids and Ideal fluids - Velocity of a fluid at a point - Stream lines and path lines - Steady and Unsteady flows – The Velocity Potential - The Vorticity Vector - Local and Particle Rates of Change – The equation of Continuity - Worked Examples - Acceleration of a Fluid.

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 - Euler's equations of Motion - Bernoulli's equation - Worked Examples - Discussion of the case of steady motion under Conservative Body Forces -Some flows involving axial symmetry.

Unit III Some Three-Dimensional Flows

Introduction - Sources, Sinks and Doublets Images in rigid infinite plane - Images in solid spheres - Axis symmetric flows - Stoke's Stream Function.

Unit IV Some Two-Dimensional Flows

The Stream Function - The Complex Velocity Potential for Two - Dimensional Irrotational, Incompressible Flow - Complex Velocity - Potentials for Standard Two-Dimensional Flows - Some Worked - Examples - Two Dimensional Image Systems - The Milne-Thomson - Circle Theorem.

Unit V Viscous Fluid

Stress components in a real fluid - Relation between Cartesian - Components of Stress - Translational motion of fluid element – The Coefficient of Viscosity and Laminar flow - The Navier-Stokes equation of a viscous fluid - Some solvable problems in viscous flow - Steady motion between parallel planes only.

Text Book

1. Frank Chorlton, Textbook of Fluid Dynamics, CBS Publishers & Distributors, 2004.
Chapter 2: Sections 2. - 2.9

Chapter 3: Sections 3.1, 3.2, 3.4 - 3.7, 3.9

Chapter 4: Sections 4.1 - 4.5

Chapter 5: Sections 5.3-5.8

Chapter 8: Sections 8.1-8.3, 8.8, 8.9, 8.10.1

Books for Supplementary Reading and Reference:

1. E.Karuse, Fluid Mechanics with Problems and Solutions, Springer, 2005.
2. R.W.Fox and A.T.McDonald, Introduction to Fluid Mechanics, Wiley, 1985.

II YEAR – III SEMESTER

COURSE CODE: 7MMA3E3

ELECTIVE COURSE-III (C) – AUTOMATA THEORY

Unit I

Definition of automata – transition system – acceptability of a string by finite automation –Non – deterministic finite state machines – the equivalence of DFA and NDFA.

Unit II

Formal languages – Chomsky classification of languages – Languages and their relations.

Unit III

Recursive and Recursively Enumerable sets – Operation on languages – Languages and Automata.

Unit IV

Regular expressions – finite Automata and regular expansions – Pumping Lemma for regular sub–closure properties of regular sets.

Unit V

Context – Free languages – simplication of context free Grammar – Normal forms for context free languages.

Text Book

K.L.P.Mishra and N. Chandrasekaran, Theory of Computer Science, (Automata, Languages and Computation) III Edition, Prentice Hall of India (2007).

Chapter III : (Sections 3.1 to 3.7)
Chapter IV : (Sections 4.1 to 4.6)
Chapter V : (Sections 5.1 to 5.5)
Chapter VI : (Sections 6.1 to 6.4)

Books for Supplementary Reading and Reference:

1. **John E.Hopcroft, Rajeev Motwanl, Jeffrey D.Ullmon, Introduction to Automata Theory, Langauges and Computation, 3rd edition, Pearson Addison Wesley.**

2. **Harry R.Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, 2nd edition, Prentice Hall, 1997.**

COURSE CODE: 7MMA3E4

ELECTIVE COURSE- IV- (A) – FUZZY MATHEMATICS

Unit I

Crisp sets and fuzzy sets.

Unit II

Operation on fuzzy sets.

Unit III

Fuzzy relations.

Unit IV

Fuzzy measures.

Unit V

Uncertainty and Information.

TEXT BOOKS

1. J.Klir and Tina A Folger, Fizzy Sets, Uncertainty and Information, Prentice Hall of India Private Ltd., New Delhi, 2006
   Chapters : I, II, III, IV and V upto section 5.5.

Books for Supplementary Reading and Reference:

1. V.Novak, Fuzzy Sets and Their Applications, Adom Hilger, Bristol, 1969.
2. A.Kaufman, Introduction to the Theory of Fuzzy Subsets, Academic Press, 1975.
3. H.J.Zimmermann, Fuzzy Set Theory and its Applications, Allied Publishers, Chennai, 1996.

COURSE CODE: 7MMA3E5

ELECTIVE COURSE IV (B) – STOCHASTIC PROCESSES

Unit I

Stochastic Processes: Basic concepts – Markov chains.

Unit II

Definition, Transition Matrix, order of Markov chain, Higher Transition probabilities – classifications of states and chains, Determinations of Higher transition probabilities.

Unit III

Stability of a Markov chain, Limiting behaviour Markov process and related distributions.

Unit IV

Generalizations of Poisson process. Birth and death process, Markov processes.

Unit V

Renewal processes: Renewal Equations, Renewal Theorems, delayed and equilibrium renewal processes, residual and excess life times.

Text Book

J. Medhi, Stochastic Processes, 2nd edition, Wiley Eastern, June 1987

Chapter II	**:**	**Full**
Chapter III	**:**	**(Sections 3.1, 3.2, 3.3, 3.4, 3.5)**
Chapter IV	**:**	**(Sections 4.1, 4.2, 4.3, 4.4, 4.5)**
Chapter VI	**:**	**(Sections 6.1, 6.2, 6.3, 6.4, 6.5)**

Books for Supplementary Reading and Reference:

1. **S.K.Srinivasan and A.Vijayakumar, Stochastic Processes, Narosa, 2003.**
2. **E.Cinlar, Introduction to Stochastic Processes, Prentice Hall of India, 1975.**

COURSE CODE: 7MMA3E6

ELECTIVE COURSE-IV (C) – COMBINATORIAL MATHEMATICS

Unit I

Generating function.

Unit II

Recurrence relation.

Unit III

The principle of inclusion and exclusion.

Unit IV

Polya theory of counting.

Unit V

Block Designs.

Text Book

CL.Liu, Introduction to Combinatorial Mathematics, Tata McGraw Hill.

Chapters	**:**	**II III, IV, V & XIV.**

Books for Supplementary Reading and Reference:

1. R.P.Stanley, Enumerative Combinatorics, Volume I, Cambridge Studies in Advanced Mathematics, Volume 49, Cambridge University Press, 1997.
2. P.J.Cameron, Combinatorics : Topics, Techniques, Algorithms, Cambridge University Press, Cambridge, 1998.