MANONMANIAMSUNDARANARUNIVERSITY-TIRUNELVELI U

PROGRAMMES

OPENANDDISTANCELEARNING(ODL)PROGRAMMES

(FORTHOSEWHOJOINEDTHEPROGRAMMESFROMTHEACADEMICYEAR2023-2024 ONWARDS)

B.SC MATHEMATICS

Semester	Course	Title of the Course	Course Code	Credits
V	Core–IX	Abstract Algebra	JMMA51	4
	Core–X	Real Analysis	JMMA52	4
	Core–XI	Mathematical Modeling	JMMA53	4
	Core–XII	Number Theory	JMMA54	4
	Major Elective-V	Discrete Mathematics	JEMA51	3
	Major Elective-VI	Combinatorial Mathematics	JEMA52	3
	NMC/Substitute Course	Statistics with Excel Programming	JNMA51	3

ABSTRACT ALGEBRA
UNIT I: Groups: Definition and Examples–Properties–Permutation Groups – Subgroups – Cyclic Groups. (Chapter3: Sections-3.1,3.2, 3.4to 3.6)
UNIT II: Order of an element–Cosets and Lagrange‟s Theorem– Normal subgroups and Quotient groups. (Chapter3:Sections-3.7to3.9)
UNIT III: Isomorphism- Cayley‟s Theorem–Homomorphisms- Fundamental Theorem. (Chapter3: Sections-3.10and 3.11)
UNITIV: Rings: Definition and examples –Properties – Types of rings – Characteristic of a ring– Subrings–Ideals. Some special classes of rings- homomorphism of rings- Ideals and quotient rings- More ideals and quotient rings. (Chapter4:Section-4.1,4.2,4.4to4.7)
UNIT V: Quotient Rings – Maximal and Prime Ideals –Homomorphism and Isomorphism of Ring -The field of quotients of an Integral Domain. (Chapter4:Section-4.3, 4.8to 4.11)

Recommended Text	S. Arumugamand A. Thangapandi Isaac, Modern Algebra, Scitech Publications, 2014.

REAL ANALYSIS
UNIT1: Metric spaces: Definition and Examples–Bounded sets– Open ball– Open sets – Subspaces– Interiorofaset. (Chapter2: Section-2.1to 2.6)
UNIT2: Closed sets–Closure– Limit point–Dense set– Complete metric space: Completeness–Cantor‟s intersection theorem– Baire‟s Category theorem. (Chapter2: Sections-2.7 to 2.10 and Chapter 3: Sections–3.1and 3.2)
UNIT3: Continuity: Continuity –Homeomorphism–Uniform Continuity– Discontinuous functions on R. (Chapter4:Sections-4.1to 4.4)
UNIT4: Connectedness: Definition and Examples–Connected subsets of R– Connectedness and continuity–Contraction mapping theorem. (Chapter 5:Sections-5.1to 5.3 and Chapter 8: Section-8.1)
UNIT5: Compactness: Compact metric spaces–Compact subsets of R– Equivalent characterizations for compactness–Compactness and Continuity. (Chapter6: Sections-6.1to6.4)

Recommended Text	S. Arumugam and A. Thangapandi Issac, Modern Analysis, New Gamma Publishing House, Palayamkottai, 2015

MATHEMATICAL MODELLING	
UNIT I: Mathematical Modelling: Simple situations requiring mathematical modelling, characteristics of mathematical models. (Chapter1:Sections-1.1and1.4)	
UNIT II: Mathematical Modelling through differential equations: Linear Growth and Decay Models. Non-Linear growth and decay models, Compartment models. (Chapter2: Sections-2.1to2.4)	
UNIT III: Mathematical Modelling, through system of Ordinary differential equations of first order: Prey-predator models, Competition models, Model with removal and model with immigrations. Epidemics: simple epidemic model, Susceptible-infected- susceptible (SIS) model, SIS model with constant number of carriers. Medicine: Model for Diabetes Mellitus. (Chapter3: Sections-3.1.1,3.1.2,3.2.1to3.2.4,3.2.6,3.5.1)	
UNIT IV: Introduction to difference equations. (Chapter5: Sections -5.1, 5.2.1 to 5.2.3)	
UNIT V: Mathematical Modelling through difference equations: Harrod Model, cob web model application to Actuarial Science (Chapter5: Sections-5.3.1,5.3.2, 5.3.4)	
Recommended Text	1. JN Kapur, Mathematical Modeling, New Age International Publishers,2009.

NUMBER THEORY
UNIT I: Preliminaries: Mathematical induction– The Binomial Theorem– Early Number Theory. (Chapter1: Sections-1.1, 1.2and Chapter2: Section – 2.1)
UNIT II: Division Algorithm–GCD–Euclidean Algorithm– The Diophantine Equation$ax + by = c$. **(**Chapter2:Sections-2.3 to2.5)
UNIT III: The fundamental Theorem of Arithmetic–The Sieve of Eratosthenes– The Gold bach conjecture. (Chapter3:Sections -3.1to 3.3)
UNITIV: Basic properties of congruences– Binary and Decimal representation of integer Linear congruence and The Chinese Remainder Theorem. (Chapter4: Sections–4.2 to 4.4)
Unit V: Fermat's Theorem–Wilson's Theorem–The Fermat- Kraitchik Factorization Method. (Chapter5: Sections-5.1to 5.4)
Recommended Text
1. David M. Burton, Elementary Number Theory, Mc Graw Hill Education (India) Pvt. Ltd., New Delhi, 2014.

DISCRETE MATHEMATICS

UNIT I: Mathematical logic: Statements and Notations – Connectives– Negation –Conjunction –Disjunction –Statement formulas and truth table – Conditional and Biconditional–Well-formed formulas– Tautologies. (Chapter1: Sections-1.1,1.2.1 to1.2.4,1.2.6 to1.2.8)

UNIT II: Normal forms–Disjunctive Normal forms Conjunctive Normal forms Principal Disjunctive Normal forms–Principal conjunctive Normal forms – Ordering and Uniqueness of Normal forms – Validity using truth tables – Rules of inference.
(Chapter1: Sections-1.3.1to1.3.5,1.4.1,1.4.2)

UNIT III: The Predicate calculus–Predicates –The Statement function, Variables and quantifiers–Predicate formulas–Free and bound variables–The Universe of discourse–Inference theory of the predicate calculus–Valid formulas and Equivalence–Some valid Formulas over finite Universes–Special valid formulas involving quantifiers – Theory of inference for the Predicate calculus. (Chapter1:Sections-1.5.1to1.5.5and1.6.1to1.6.4)

UNIT IV: Relations and Ordering–Relations–Properties of Binary relations in a set–Partial ordering– Partially ordered set: Representation and associatedterminology–Functions:Definition and Introduction – Composition of functions– Inverse functions.
(Chapter2: Sections -2.3.1,2.3.2,2.3.8,2.3.9,2.4.1to2.4.3)

UNIT V: Lattices as partially ordered sets: Definition and examples Some properties of Lattices–Sublattices, Direct product and Homomorphism–Boolean algebra: Definition and examples– Sub Algebra, Direct product and Homomorphism.
(Chapter4: Sections-4.1.1, 4.1.2, 4.1.4, 4.2.1, 4.2.2)

Recommended Text

1. J.P. Tremblay, R. Manohar, Discrete Mathematical structures with Applications to Computer Science, TataMcGrawhill,2001.

COMBINATORIAL MATHEMATICS
UNIT I: Selections and Binomial coefficients–Permutations–Ordered selections–unordered selections– Miscellaneous Problems. (Chapter1: Sections - 1.1to 1.4)
UNIT II: Parings Problems: Pairings with in a set–Pairing between sets. (Chapter2: Sections-2.1and 2.2)
UNIT III: Recurrence–Fibonacci-type relations using generating functions– Miscellaneous methods. (Chapter3:Sections-3.1to 3.4)
UNIT IV: The Inclusion-Exclusion Principles –Rook Polynomial. (Chapter4: Sections-4.1to 4.3)
UNIT V: Block designs– Square block designs. (Chapter5: Sections-5.1, 5.2)
Recommended Text
Ian C. Andersen, A First Course in Combinatorial Mathematics, Clarendon Press, Oxford, 1989.

STATISTICS WITH EXCEL PROGRAMMING	
UNIT I: Distribution of data- Characteristics of data - Frequency distribution - Procedure for Constructing a Frequency Distribution- Using Excel to Construct a Frequency Distribution – Relative Frequency Distribution - Cumulative Frequency Distribution. (Chapter 2: Pages 58 to 70)	
UNIT II: Histograms - Relative Frequency Histogram - Normal Distribution - Common Distribution Shapes – Skewness - Using XLSTAT for Histograms – Graphs – Using Excel to Construct a Scatter plot – Correlation Coefficient. (Chapter2:Pages70to81)	
UNIT III: Time-Series Graph – Dot plots - Using XLSTAT for Stem plots - Bar Graphs - Using Excel to Create Bar Graphs – Pare to Charts - Pie Charts - Using Excel to Create Pie Charts - Frequency Polygon – Using Excel to Create Frequency Polygons. (Chapter 2: Pages 81to 98)	
UNIT IV: Descriptive statistics – Measures of Center-Mean-Using Excel to Calculate the Mean - Median - Using Excel to Find the median. (Chapter 3:Pages 110 to114)	
UNIT V: Mode-Using Excel to Find the Mode - Midrange-Using Excel to Calculate the Midrange-Weighted Mean-Using Excel for Descriptive Statistics. (Chapter-3: Pages114 to125)	
Recommended Text	1.Mario F. Triola, Elementary Statistics Using Excel, Fifth Edition, Pearson New International Edition, 2014.