MANONMANIAM SUNDARANAR UNIVERSITY -TIRUNELVELI
PG PROGRAMMES

OPEN AND DISTANCE LEARNING (ODL) PROGRAMMES

(FOR THOSE WHO JOINED THE PROGRAMMES FROM THE ACADEMIC YEAR 2023-2024 ONWARDS)

M.Sc. Mathematics

Semester	Course	Title of the Course	Course Code
IV	Core XI	Functional Analysis	SMAM41
	Core XII	Differential Geometry	SMAM42
	Elective VI	Ring Theory and Lattices	SMAE41
	Skill Enhancement Course III	Financial Mathematics	SMAS41
	Project	Project with Viva-Voce	SMAR41
	Extension Activity		SMAX41

FUNCTIONAL ANALYSIS

UNIT	Details
I	**Banach Spaces:** The definition and some examples – Continuous linear transformations – The Hahn-Banach theorem – The natural imbedding of N in N^{**} Chapter 9: Sections 46-49
II	The open mapping theorem – The conjugate of an Operator. The definition and some simple properties–Orthogonal complements–Orthonormal sets Chapter 9: Sections 50-54
III	The conjugate space H^*-The adjoint of an operator–self-adjoint operators-Normal and unitary operators – Projections. Chapter10: Section 55-59
IV	**Finite-Dimensional Spectral Theory:** Determinants and the spectrum of an operator –The spectral theorem. Chapter11:Sections 61,62
V	**General Preliminaries on Banach Algebras:** The definition and some examples – Regular and singular elements – Topological divisors of zero – The spectrum – The formula for the spectral radius– The radical and semi-simplicity. Chapter12:Sections64-69

Recommended Text	G.F. Simmons, *Introduction to Topology and Modern Analysis*, McGraw Hill Education(India)PrivateLimited,NewDelhi,1963.

DIFFERENTIAL GEOMETRY

UNIT	Details
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- Helies. Chapter I: Sections 1 to 9.
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.
III	**Geodesics:** Geodesics – Canonical geodesic equations – Normal property of geodesics- Existence Theorems – Geodesic parallels – Geodesics curvature- Gauss- Bonnet Theorem – Gaussian curvature- surface of constant curvature. Chapter II: Sections 10 to 18.
IV	**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.
V	**Differential Geometry of Surfaces :**Compact surfaces whose points are umblics- Hilbert's lemma – Compact surface of constant curvature – Complete surface and their characterization – Hilbert's Theorem – Conjugate points on geodesics. Chapter IV: Sections 1 to 8

Recommended Text	T.J.Willmore, *An Introduction to Differential Geometry,* Oxford University Press,(17thImpression)NewDelhi2002.(Indian Print)

RING THEORY AND LATTICES

UNIT	Details
I	Ring Homomorphisms – Ideals and Quotient Rings – More Ideals and Quotient Rings – The field of Quotients of an Integral Domain Text 1: Sections: 3.3 – 3.6
II	Euclidean Rings –A Particular Euclidean Ring. Text 1: Sections: 3.7 and 3.8
III	Polynomial Rings – Polynomials over Rational Field – Polynomial Rings over Commutative Rings Text1: Sections:3.9 – 3.11.
IV	Certain Radical sofa Ring –Jacobson Radical of a Ring –Semi simple Ring – Nil Radical Text2: Chapter 8: Definition 8.1 –Theorem 8.10.
V	Partially Ordered sets and Lattices- Distributivity and Modularity- The theorem of Jordan Holder - Boolean Algebra Text 3: Chapter 8 Sections 8.1-8.3 & 8.5

Recommended Text	1. TopicsinAlgebra,I.N.Herstein,2nd Edition,WileyStudentedition 2. A first Course in Rings and Ideals, David M. Burton, Addison - Wesley Publishing Company. 3. Basic Algebra 1 Nathan Jacbson Yale University, W.H.Freeman and company. New York, 2nd Edition

Financial Mathematics

UNIT	Details
I	Probability and Normal Random Variables
II	Brownian Motion and Geometric Brownian Motion
III	Interest Rate and Present Value Analysis
IV	Pricing Contracts via Arbitrage
V	The Arbitrage Theorem

Recommended Text	Sheldon M. Ross, An Introduction to Mathematical Finance : Options and Other Topics, Second Edition, Cambridge University Press, First published2002.