MANONMANIAMSUNDARANARUNIVERSITY-TIRUNELVELI

UG **PROGRAMMES**

OPENANDDISTANCELEARNING(ODL)PROGRAMMES

(FORTHOSEWHOJOINEDTHEPROGRAMMESFROMTHEACADEMICYEAR2023-2024 ONWARDS)

B.SC MATHEMATICS

Semester	Course	Title of the Course	Course Code	Credits
VI	Core–XIII	Linear Algebra	JMMA61	4
	Core–XIV	Complex Analysis	JMMA62	4
	Core–XV	Mechanics	JMMA63	4
	Elective-VII	Graph Theory	JEMA61	3
	Elective-VIII	Financial Mathematics	JEMA62	3
	NMC/Substitute Paper	MATLAB	JNMA61	3

LINEAR ALGEBRA
UNIT I: Vector Spaces: Definition and examples–Subspaces–Linear Transformations–Fundamental the oremofhomomorphism. (Chapter 5: Sections -5.1 to 5.3)
UNIT II: Span of a set–Linear Dependence and Independence–Basis and Dimension. (Chapter 5: Sections-5.4 to 5.6)
UNIT III: Rank and Nullity of a transformation– Matrix of a linear transformation – Inner product space: Definition and examples– Orthogonality – Orthogonal complement. (Chapter 5: Sections-5.7, 5.8 and Chapter 6: Sections-6.1to 6.3)
UNIT IV: Matrices – Elementary transformation – Rank of a matrix – Simultaneouslinearequations–CharacteristicequationandCayley-Hamilton Theorem. (Chapter7: Sections -7.4to7.7)
UNIT V: Eigen values and Eigen vectors–Properties and problems– Bilinear forms – Quadratic forms – Reduction of quadratic form to diagonal form. (Chapter7: Sections-7.8 and Chapter8: Sections-8.1, 8.2)
Recommended Text
S. Arumugamand A. Thangapandi Isaac, Modern Algebra, Scitech, 2014.

COMPLEX ANALYSIS	
UNIT I: Functions of a Complex variable –Limits –Theorem on limits – Continuity– Derivatives – Differentiation formulas – Cauchy Riemann equation – conditions for differentiability – Polar coordinates–Analytic functions– Harmonic functions. (Chapter2: Sections-2.1to 2.8)	
UNIT II: Conformal Mapping– Elementary Transformation – Bilinear Transformation – Cross Ratio – Fixed Points. (Chapter2:Section-2.9 and Chapter3:Sections–3.1to3.4)	
UNITIII: Complex Integration: Definite Integral – Cauchy's Theorem– Cauchy integral formula – Higher Derivatives. (Chapter6: Sections-6.1to 6.4)	
UNIT IV: Sequence and Series– Power Series– Taylor's series– Laurent series– Zeros of an Analytic function – Singularities. (Chapter4: Sections-4.1,4.3 and Chapter7: Sections-7.1to7.4)	
UNIT V: Residues–Cauchy Residue theorem–Residue at infinity– Evaluation of Definite Integrals. (Chapter8: Sections-8.1to 8.3)	
Recommended Text	1. S. Arumugam, A. Thangapandi Isaac and A.Somasundaram, Complex Analysis, Scitech, 2014.

MECHANICS
UNIT I: Force: Newton's laws of motion –Resultant of two forces on a particle - Equilibrium of a Particle: Equilibrium of a particle –Limiting equilibrium of a particle on an inclined plane. (Chapter2: Section-2.1,2.1andChapter3: Section-3.1,3.2)
UNIT II: Forces on a Rigid Body: Moment of a Force – General motion of a body – Equivalent systems of forces- Parallel Forces – Forces acting along a Triangle - A specific reduction of Forces: Reduction of coplanar forces into a force and couple – Problems involving frictional forces. (Chapter4: Section-4.1to4.5andChapter5: Sections-5.1,5.2)
UNIT III: Work, Energy and Power: Work – Conservative field of force – Power – Rectilinear Motion under Varying Force: Simple Harmonic Motion - along a horizontal line – along a vertical line. (Chapter11: Sections-11.1to 11.3; Chapter12: Sections-12.1 to12.3)
UNIT IV: Projectiles: Forces on a projectile–Projectile projected on an inclined plane. (Chapter13: Sections-13.1, 13.2)
UNIT V: Central Orbits**:** General orbits–Central orbit–Conic sac entered orbit. (Chapter16: Sections-16.1to16.3)
Recommended Text: 1. P. Duraipandian, Laxmi Duraipandian and Muthamizh Jayapragasm, Mechanics, S. Chand & Company Ltd,2007.

GRAPH THEORY

UNIT I: Introduction – Application of Graphs – Finite and Infinite graphs–Incidence and degree–Isolated vertex, Pendent vertex and Null graph – Isomorphism –Subgraphs – Walks, Paths and Circuits Connected Graphs – Disconnected Graphs and Components. (Chapter1: Sections-1.1to1.5 and Chapter2 :Sections2.1, 2.2, 2.4, 2.5)
UNIT II: Euler graphs–Operations on Graphs–More on Euler graphs– Hamiltonian Paths and Circuits – Trees – Some properties on Trees – Pendent vertices in a Tree –Distance and Centers in a Tree–Spanning Trees. **(**Chapter2:Sections -2.6 to 2.9 and Chapter 3:Sections -3.1to 3.4, 3.7)
UNIT III: Incidence Matrix–Circuit Matrix–Fundamental Circuit Matrix and Rank of B – Path Matrix – Adjacency Matrix. (Chapter7:Sections -7.1,7.3, 7.4,7.8, 7.9)
UNITIV: Planar Graphs– Kuratowski‟s Two Graphs–Euler's formula– Chromatic Number–Chromatic Partitioning–Chromatic Polynomial. (Chapter 5: Sections - 5.2 to 5.4 and Chapter 8: Sections - 8.1to 8.3)
UNIT V: Matchings–Coverings–Four Colour Problem–Definition– Some types of Digraphs – Directed Paths and Connectedness – Euler Digraphs. (Chapter8: Sections -8.4 to 8.6; Chapter9: Sections-9.1, 9.2, 9.4, 9.5)

Recommended Text	Narsingh Deo, Graph Theory with Applications to Engineering & Computer Science, Prentice Hall of India, New Delhi, 1974.

FINANCIAL MATHEMATICS
UNIT I: Mathematics of Investment: Stocks–Bonds–Mutual funds. (Chapter5: Sections-1to3)
UNIT II: Mathematics of Investment: Options–Cost of Capital and Ratio. **(**Chapter5: Sections-4and 5)
Unit III: Mathematics of Return and Risk: Measuring Return and Risk– The Capital Asset Pricing Model. (Chapter6: Sections-1and2)
Unit IV: Mathematics of Insurance: Life Annuities–Life Insurance. (Chapter7: Sections-1, 2.1to 2.8)
Unit V: Mathematics of Insurance: Life Insurance–Property and Casualty Insurance. (Chapter7: Sections-2.9 to 2.14, 3) **Recommended Text**
M.J. Alhabeeb, Mathematical Finance, A John Wiley & Sons, Inc., Publication, 2012.

MATLAB
UNIT I: Starting MATLAB, MATLAB – Windows working in the command window– Arithmetic operations with scalars–Display formats– Elementary Math Built-in functions – Defining scalar variables – Useful commands for managing variables – Related problems. (Chapter1: Sections-1.1 to1.7)
UNIT II: Creating Arrays: Creating a one-dimensional array (Vector) - Creating a two-dimensional array (Matrix) – The transpose operator – Arrayaddressing Using a colon in address in garrays–Adding elements to existing variables–Deleingelements–Built-infunctions for handling arrays – Related problems. **(**Chapter 2: Sections-2.1to2.9)
UNIT III: Mathematical Operations with Arrays: Addition and subtraction -Array multiplication– Array division–Element-by-Element Operations -Using arrays in MATLAB Built-in Math functions–Built-in functions for analyzing arrays **–** Related problems. (Chapter3: Sections-3.1to 3.6)
UNIT IV: Creating and Saving a Script File – Running a Script File – In putto Script File–Output commands–The save and load commands– Related problems. (Chapter1: Section-1.8andChapter4: Sections-4.1to4 .4)
UNIT V: The Plot command–The f plot command-Plotting multiple graphs in the same plot – Plots with Logarithmic Axes - Plots with Special Graphics – Histograms – Polar plots – Related problems. (Chapter5: Sections-5.1 to5.3,5.5, 5.7to 5.9)

Recommended Text	Amos Gilat, MATLAB-An Introduction with Applications**,** The Ohio State University, Wiley,2012.