SEC-I : Mathematical Techniques

Prerequisite: 12th pass with mathematics as a subject.

Unit 1. Transforms: Integral Transforms, Laplace Transforms, elementary properties, Unit step function, shifting theorem, transforms of derivatives and derivative of transforms.

Unit 2. Inverse Laplace Transforms: Inverse Laplace transforms, use of partial fractions, convolution theorem.

Unit 3. Applications: Solution of differential equations using Laplace transforms, Initial value problems.

Unit 4. Introduction to Fourier Transforms: Finite Fourier transforms, Fourier Sine transforms, Fourier Cosine transforms,

Recommended Books:

1. Joel L. Schiss, The Laplace Transforms: Theory and Applications, Springer.
2. E. M. Stein and Rami Shakarchi, Fourier Analysis, An Introduction: Levant Books, Kolkata.

SEC-II : Data Analysis Methods

Prerequisite: 12th pass in any discipline.

Unit 1. Introduction: Data, Primary and secondary data, qualitative and quantitative data, Categorical, Numerical and Time-series data,

Unit 2. Data Visualization: Bar chart, Pie chart, Histogram, Scatter plots, Boxplot, Line chart,

Unit 3. Statistics: Measures of Central Tendency: Mean, Median, Mode, Measures of Dispersion: Range, Variance, Standard Deviation, correlation and regression analysis.

Unit 4. Curve Fitting: least square curve fitting procedure, fitting straight line, curve fitting by polynomial.

Recommended Books:

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, S Chand and Sons.
2. Deepak Shrivastava, Introduction to Data and Data Analysis, Notion Press.

SEC-III : Financial Mathematical analysis

Prerequisite: 12^{th} pass in any discipline.

Unit 1. Interest: simple and compound, discrete and continuous, Time Value of Money and Cash Flows.

Unit 2. Concept of inflation, deflation, banking system, taxation system, Mutual funds, Annuities and Bonds, bond prices and yields.

Unit 3. Stocks and Stock Price Models, Arbitrage and Risk-Neutral Pricing, Value at risk, Dividend Paying Stock

Unit 4. Portfolio Management: Expected Utility Functions, Portfolio Optimization for Two Assets, Portfolio Optimization for N Assets

Recommended Books:

1. Amber Habib, The Calculus of Finance, University of Hyderabad.
2. Steven Roman, Introduction to mathematics of Finance, Springer International Edition.