

Quantitative Techniques in Finance

Purpose and Scope:

The course on Quantitative Techniques in Finance (QTF) deals with fundamental concepts and models of quantitative measures required for scientific decision making with specific examples and case studies relevant to the Banking and Financial Sector. It covers basic statistics, probability, numerical techniques and operations research models with examples, exercises and case studies to develop necessary skills to understand, formulate, analyze and handle important real-life financial problems. Analytical tools such as MS-EXCEL and MATLAB will be used for the analysis and solution of formulated problems.

Prerequisite : Mathematics and Statistics

Contents :

Module-A : Valuation Techniques :

Bond Characteristics and valuation, Cash flows, Simple and Compound Interest, Discounting, Present and Future value for single and multiple periods, Yield Curves, Financial Ratios, Asset pricing techniques, Rate of Return, Statistical measures, Continuous and Discrete Probability distributions, Introduction to Spreadsheet Tool and Matlab.

Module-B : Forecasting Techniques

Linear and Non-linear Interpolation, Regression, Time series, Financial Risks, Balance sheet analysis, Profit and Loss Account Analysis, Asset Liability Management using GAP and DGAP Models, VAR, Simulation and its applications to Demand distribution, Service Queues, Future inventory requirements.

Module-C: Linear and Non-Linear Programming Techniques

LPP and NLPP Formulation and Solution, Application to various financial problems, Network optimization problems, Multi-Stage Financial Decisions, Dynamic Programming, Supply Chain Management and Currency Flows, Portfolio Problems, Solution using spreadsheet (MS-Excel Tools) and Matlab.

Module-D: Multiple Objective and Dynamic Optimization Techniques

Pareto Optimality, Multiple Objective Decision Making models for selection of technology, software, personnel , facility location and portfolios, Goal Programming, Analytical Hierarchy Process, Data Envelopment Analysis, Economic Optimal Control Problems.

Module-E: Stochastic Programming Techniques

Formulation of SP Models for linear and Non-linear Type, SP models for ALM, Risks and Investment Problems, Multi-objective SP, Financial Games.

References :

1. Methods for business analysis and forecasting text and cases, Tryfos, Peter, John Wiley & Sons, 1998.
2. Financial Engineering and Computation, Yuh-Dauh Lyuu, Cambridge University Press, 2002.
3. Quantative Analysis for Management, Barry Render, Ralph M.Stair Jr., Michael, Pearson Education Inc., Delhi, 2003.
4. Quantitative business methods using Excel, Whigham, David, Oxford University Press, 1998.
5. Operations research: an introduction, Taha, Hamdy A., Prentice Hall of India, new Delhi, 2001.

6. Principles of operations research with application to managerial decisions, Wagner, Harvey M., Prentice- Hall of India, New Delhi, 1996.
7. Decision Making and Information System Analysis, Krishna Chandra, Sarup & Sons Publ., New Delhi, 2002.
8. Introduction to Management Science, Prentice Hall, Taylor, B. W. , 2002.
9. Mathematical modeling: case studies from industry, Cumberbatch, Ellis; Fitt, Alistair, Cambridge University Press, 2001.
10. Valuation of Financial Assets, A.S.Ramasasrti, Response Books, New Delhi, 2000.
11. Operations Research, Kanti Swaroop, P.K.Gupta and Man Mohan, Wiley, 2000.
12. Operations Research, S.Dharani Venkatakrishnan, Keerthi Publishing House Pvt. Ltd, Coimbatore, 1992.
13. Quantitative models for supply chain management, Tayur, Sridhar; Ganeshan, Ram;, Magazine, Michael, Kluwer Academic Publishers, 1999.
14. Monte Carlo Methods in Finance, Jaeckel, Peter, John Wiley & Sons, 2002.
15. Monte Carlo Methods in Financial Engineering, Glasserman, Paul, Springer-Verlag, 2003.
16. Financial Engineering, John F.Marshall and Vipul K.Bansal, Prentice Hall of India, New Delhi, 1996.