INDIAN INSTITUTE OF QUANTITATIVE FINANCE

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2021 FRM EXAM TRAINING SYLLABUS

PART I

Introduction to Financial Mathematics

1. Introduction to Financial Calculus
    a. Variables – Discrete and Continuous
    b. Univariate and Multivariate Functions – Dependent variable and Independent variable
    c. Physical representation of a function
    d. Linear and Non-Linear functions
    e. Limits of a function
    f. The number e and Natural Logarithm
    g. Differential Calculus – Differentiation, Interpretation - Slope of a tangent, using derivatives to calculate function values and deltas. Linear functions - 1st order derivative. Non-linear functions – 1st and higher order derivatives, interpretations and usage. Rules of derivatives.
    h. Functions – Differentiation and Taylor Series Expansion
    i. Introduction to Partial Derivatives
    j. Introduction to Integral Calculus
2. Introduction to Bond Mathematics
    a. Finance and the Time Value of Money
    b. Concept of Zero Coupon (Discount) Bonds and Coupon Bonds.
    c. Bond Characteristics
    d. Bond Types – Fixed Rate, Floating Rate, Inverse Floater Rate, etc.
    e. Interest Rates – Discrete and Continuous Compounding
    f. Bond Pricing – using ZCYC or YTMC with discrete compounding or continuous compounding
    g. Difference between bond coupon rate and bond yield
    h. Calculating Bond Yield (YTM, CY, MMY, ZCY/Spot, Par Yield, etc.)
    i. Price Yield Relationship

Introduction to Financial Statistics

1. Introduction to Financial Statistics
    a. Frequency distributions
    b. Measures of Central Tendency/Location (Mean/Mode/Median)
    c. Dispersion, Measures of Dispersion (Variance/SD/Quartiles/Percentiles/Ranges) and its relevance to Risk Management
    d. Correlations

2. Introduction to Probability Theory

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a. Random variables
b. Probability and its uses
c. Probability Rules
d. Conditional Probabilities
e. Probability Distributions (Single Variable)
    i. Continuous Time/Discreet Time; Continuous Value/ Discreet Value
    ii. Probability Mass Function
    iii. Probability Density Function
    iv. Cumulative Distribution Function
    v. Applications and relevance in Risk Management
f. Mathematical Expectation
g. Moments of Distribution (Mean, Variance, Skewness, Kurtosis), Central Moments, Standardized Moments

Quantitative Analysis

This area tests a candidate's knowledge of basic probability and statistics, regression and time series analysis, and various quantitative techniques useful in risk management such as:

1. Discrete and continuous probability distributions
2. Estimating the parameters of distributions
3. Population and sample statistics
4. Bayesian analysis
5. Statistical inference and hypothesis testing
6. Measures of correlation
7. Linear regression with single and multiple regressors
8. Time series analysis and forecasting
9. Simulation methods

Foundations of Risk Management

This area focuses on a candidate's knowledge of foundational concepts of risk management and how risk management can add value to an organization and includes:

1. Basic risk types, measurement, and management tools
2. Creating value with risk management
3. Risk governance and corporate governance
4. Credit risk transfer mechanisms
5. The Capital Asset Pricing Model (CAPM)
6. Risk-adjusted performance measurement
7. Multifactor models
8. Data aggregation and risk reporting
9. Financial disasters and risk management failures
10. Ethics and the GARP Code of Conduct

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Financial Markets and Products

This area tests the candidate's knowledge of financial products and the markets in which they trade including:

1. Structures and functions of financial institutions
2. Structure and mechanics of OTC and exchange markets
3. Structure, mechanics, and valuation of forwards, futures, swaps, and options
4. Hedging with derivatives
5. Interest rates and measures of interest rate sensitivity
6. Foreign exchange risk
7. Corporate bonds
8. Mortgage-backed securities

Valuation and Risk Modeling

This area will test a candidate's knowledge of valuation techniques and risk models such as:

1. Value-at-Risk (VaR)
2. Expected shortfall (ES)
3. Estimating volatility and correlation
4. Economic and regulatory capital
5. Stress testing and scenario analysis
6. Option valuation
7. Fixed income valuation
8. Hedging
9. Country and sovereign risk models and management
10. External and internal credit ratings
11. Expected and unexpected losses
12. Operational risk

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PART II

Market Risk Measurement and Management

This section tests a candidate's knowledge of market risk measurement and management techniques. These include:

1. VaR and other risk measures
2. Parametric and non-parametric methods of estimation
3. VaR mapping
4. Back testing VaR
5. Expected shortfall and other coherent risk measures
6. Extreme Value Theory (EVT)
7. Modeling dependence: correlations and copulas
8. Term structure models of interest rates
9. Volatility: smiles and term structures
10. Fundamental Review of the Trading Book (FRTB)

Credit Risk Measurement and Management

This area focuses on a candidate's understanding of credit risk management with some focus given to structured finance and credit products such as collateralized debt obligations and credit derivatives. Areas of knowledge include:

1. Credit analysis
2. Default risk: Quantitative methodologies
3. Expected and unexpected loss
4. Credit VaR
5. Counterparty risk
6. Credit derivatives
7. Structured finance and securitization

Operational Risk and Resiliency

This section addresses a candidate's knowledge of two areas of increasing importance for many firms — operational risk management and operational resilience in the face of changing market conditions. This includes:

1. Principles for sound operational risk management
2. Risk appetite frameworks and enterprise risk management (ERM)
3. Risk culture and conduct
4. Analyzing and reporting operational loss data
5. Model risk and model validation
6. Risk-adjusted return on capital (RAROC)

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7. Economic capital frameworks and capital planning
8. Stress testing banks
9. Third-party outsourcing risk
10. Risks related to money laundering and financing
11. of terrorism
12. Regulation and the Basel Accords
13. Cyber risk and cyber resilience
14. Operational resilience

Liquidity and Treasury Risk Measurement and Management

This area tests a candidate's understanding of liquidity and treasury risk measurement and management techniques. These include:

1. Liquidity risk principles and metrics
2. Liquidity portfolio management
3. Cash-flow modeling, liquidity stress testing, and reporting
4. Contingency funding plan
5. Funding models
6. Funds transfer pricing
7. Cross-currency funding
8. Balance sheet management
9. Asset liquidity

Risk Management and Investment Management

This area focuses on a candidate's knowledge of risk management techniques applied to the investment management process, including:

1. Factor theory
2. Portfolio construction
3. Portfolio risk measures
4. Risk budgeting
5. Risk monitoring and performance measurement
6. Portfolio-based performance analysis
7. Hedge funds

Current Issues In Financial Markets

This section tests a candidate's knowledge of current issues in financial markets, including:

1. Blockchain
2. Fintech revolution
3. Artificial intelligence (AI), machine learning and big data
4. Climate change and financial risk
5. Reference rates