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FINANCIAL DERIVATIVES

EXAM REVISION NOTES

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MODULE I

INTRODUCTION TO FINANCIAL DERIVATIVES

Foundational Concepts: Meaning, Definition, and Features of Derivatives: In financial parlance, the term "derivative" designates a specialized financial contract whose economic value is entirely contingent upon, or derived from, the performance of an antecedent entity known as the underlying asset.

Core Characteristics and Essential Features of Derivative Contracts: Derivative contracts exhibit several distinct structural attributes that separate them from standard equity shares, debentures, or physical commodities:

High Inherent Leverage

Forward-Looking Horizon

Flexible Settlement Mechanisms

Risk Reallocation Without Asset Ownership

Global Evolutionary Milestones: The earliest recorded forward transaction is often attributed to ancient Mesopotamia around 4,500 years ago, where clay cuneiform tablets recorded agreements for the future delivery of grain against present silver payments.

Historical Evolution of Derivatives in India: India possesses an extensive historical tradition of forward and futures trading in commodities. The Bombay Cotton Trade Association launched organized commodity futures as early as 1875.

- **June 9, 2000:** BSE - Sensex Futures; Inauguration of exchange-traded equity derivatives in India with Sensex 30 futures.
- **June 12, 2000:** NSE - Nifty 50 Futures; Launch of Nifty 50 index futures, which rapidly grew to become the primary liquidity benchmark.
- **June 4, 2001:** NSE BSE - Index Options; Introduction of European-style call and put options on the benchmark Nifty and Sensex indices.
- **July 2, 2001:** Stock Options; Trading commenced in options on individual single stocks for eligible liquid underlying equities.

Equity Shares Stock Indices

Interest Rates Debt Securities

Commodities (Agricultural Industrial)

Credit Risk Corporate Default

Market Participants: Behavioral Roles and Economic Motivations: A resilient and functional derivative exchange requires a balanced ecosystem of diverse participants with differing risk appetites, liquidity preferences, and market horizons.

- **Core Motive:** ; Risk-free profit exploitation from mispricing.
- **Underlying Exposure:** ; Simultaneous offsetting positions across markets.
- **Risk Profile:** ; Risk-neutral; locks in fixed arbitrage spreads.
- **Holding Duration:** ; Maintained until mispricing converges or expiry.

Forward Contracts

Futures Contracts

Swap Contracts

Exchange-Traded Derivatives (ETDs) vs. Over-the-Counter (OTC) Derivatives: The institutional mechanism through which derivatives are traded, cleared, and settled represents one of the most critical structural divides in modern finance.

- **Trading Venue:** ; Direct bilateral telephone or screen-based dealer networks (interbank market).
- **Contract Terms:** ; Custom-tailored terms negotiated to meet exact corporate counterparty requirements.
- **Counterparty Risk:** ; Substantial; credit risk depends entirely on the financial solvency of the counterparty.
- **Margining Settlement:** ; Varies; historically uncollateralized, now subject to ISDA Credit Support Annexes (CSA).

Regulatory and Risk Containment Framework for Derivatives in India: The catastrophic collapse of Barings Bank (1995), the failure of Long-Term Capital Management (1998), and the systemic contagion of the 2008 Global Financial Crisis underscore the destructive potential of improperly monitored financial derivatives.

Legislative and Regulatory Foundations: The regulatory authority governing Indian financial derivatives derives from the Securities Contracts (Regulation) Act, 1956 (SCRA) and the Securities and Exchange Board of India Act, 1992 (SEBI Act).

Two-Tier Margining Architecture

Central Counterparty (CCP) Novation

Market-Wide Position Limits (MWPL)

Client and Trading Member Position Limits

Landmark Institutional Case Studies: Risk Management Lessons: The history of derivative markets provides vital lessons regarding the hazards of unmonitored financial leverage, inadequate internal controls, and operational breakdowns.

MODULE II

FORWARDS AND FUTURES CONTRACTS

Forward Contracts: Features, Advantages, and Operational Limitations: A forward contract is the simplest and historically oldest form of derivative instrument. Formally, a forward contract is a bilateral agreement negotiated directly between two parties Over-the-Counter, wherein the buyer (holding the long position) agrees to purchase a specified quantity of an underlying asset from the seller (holding the short position) at a predetermined price (the forward price) on an agreed future maturity date.

Advantages and Practical Utility of Forward Contracts: Forward contracts offer distinct corporate advantages that maintain their popularity in global treasury management:

- **Perfect Hedging Fit (Zero Basis Risk):** Because terms are fully customizable, a corporate treasurer can design a forward contract whose delivery date, currency amount, and specifications match an anticipated commercial transaction exactly, eliminating basis risk.
- **Zero Upfront Cash Outlay:** Counterparties do not need to lock up working capital in initial margin deposits or manage daily variation margin calls.
- **Commercial Privacy:** Transaction details, pricing, and volume remain confidential between the contracting parties and their interbank dealers.

Structural Limitations and Risks of Forward Contracts: Despite their flexibility, forward contracts suffer from fundamental market imperfections that historically led to the innovation of organized futures exchanges:

Illiquidity and Exit Friction

Opaque Price Discovery

Futures Contracts: Meaning, Definition, and Features: A futures contract is a legally binding, standardized agreement traded on an organized, regulated exchange to buy or sell a specific quantity and quality of an underlying asset at a predetermined price on a specified future date.

Comprehensive Comparative Analysis: Forwards vs. Futures

- **Trading Environment:** ; Organized, regulated electronic exchanges (NSE, BSE, MCX, CME).

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- **Contract Terms:** ; Rigidly standardized by the exchange (lot size, tick size, expiry).
- **Counterparty Risk:** ; Virtually eliminated; backed by clearing corporation novation and SGF.
- **Settlement Cadence:** ; Marked-to-market daily; interim profits/losses settled every session.

Margin Architecture and the Mechanics of Daily Mark-to-Market (M2M): The operational integrity and zero-default record of modern futures exchanges are underpinned by a multi-tiered margin architecture.

Taxonomy of Exchange-Traded Futures Contracts: Exchange-traded futures encompass an expansive spectrum of financial and physical asset categories. On Indian and global exchanges, contracts are categorized into five primary classes:

Stock Futures (Single Stock Futures)

Currency Futures (FX Futures)

Interest Rate Futures (IRF)

Theoretical Pricing of Futures Contracts: The Cost of Carry Model: The equilibrium price of a futures contract is governed by the Cost of Carry Model. In an efficient capital market with zero arbitrage opportunities, the futures price must reflect the spot price of the underlying asset plus the net financial and physical costs incurred in purchasing and holding (carrying) the asset until future delivery date.

No-Arbitrage Enforcement: Cash-and-Carry vs. Reverse Cash-and-Carry: The Cost of Carry equation is not merely a theoretical hypothesis; it is an economic identity strictly enforced by arbitrageurs.

Cash-and-Carry Arbitrage (Fmarket > Ftheoretical)

Positions in Futures and Payoff Profiles: Futures contracts exhibit linear, symmetric payoff profiles. Unlike options, where potential losses or gains are truncated, futures expose both long and short market participants to unbounded profit potential and unbounded downside risk in equal measure.

Long Futures Position (Buyer)

Tabular Payoff Schedule: Long vs. Short Futures: Consider a futures contract entered at an initial price of F0 = INR 1,000 (contract multiplier = 100 shares). The terminal payoffs across various spot prices at expiration (ST) illustrate perfect linear symmetry:

- **INR 800:** -INR 20,000 (Loss)
- **INR 900:** -INR 10,000 (Loss)
- **INR 1,000 (Breakeven):** INR 0 (Breakeven)
- **INR 1,100:** +INR 10,000 (Profit)

Hedging and Trading Strategies with Futures: Futures contracts provide institutional investors and commercial enterprises with powerful quantitative risk management tools.

Basis Risk and Spread Trading Strategies: In real-world commercial hedging, hedging rarely eliminates risk entirely due to Basis Risk. The basis is defined as the difference between the spot price of the asset being hedged and the futures price of the contract used:

Inter-Commodity Spreads

Summary Synthesis

- **Contract Architecture:** ; Standardized, fungible exchange-traded contracts.
- **Credit Default Risk:** ; Eliminated via Central Counterparty (CCP) novation.
- **Margining M2M:** ; Mandatory daily Mark-to-Market (SPAN + ELM).
- **Pricing Model:** ; Enforced by cash-and-carry and reverse arbitrage.

Empirical Casework: Forensic Analysis, Audit Trail Verification, and Internal Controls: Empirical accounting investigations across modern industrial enterprises illustrate that financial distortion, fraud, and misstatement rarely occur as isolated incidents; rather, they stem from structural vulnerabilities within accounting workflows, segregation-of-duties lapses, or inadequate internal audit scrutiny.

- **Ledger amp; Voucher Integrity:** ; Companies Act (Sec.
- **Revenue amp; Cost Allocation:** ; Ind AS 115 (Revenue from Contracts with Customers) amp; CAS 1 to 24 Cost Accounting Standards.
- **Fiscal Risk amp; Tax Compliance:** ; GST Law Section 16/36 Rules amp; Income Tax Act Transfer Pricing Provisions.
- **Working Capital Governance:** ; Tandon amp; Chore Committee Norms for Bank Working Capital Credit Appraisal.

Comparative Regulatory and Practical Implementation Standards: A rigorous examination of corporate commercial practice highlights the indispensable role of standardized accounting principles.

MODULE III

OPTIONS CONTRACTS AND TRADING STRATEGIES

Foundational Concepts: Meaning, Definition, and Option Terminology: Formally defined, an option is a legally binding derivative contract entered into between two counterparties, wherein the option buyer (holder) pays a non-refundable upfront Sum of (the option premium) to the option seller (writer).

Standard Option Terminology and Contract Parameters: Mastering options requires complete familiarity with standard exchange-traded terminology:

Strike Price / Exercise Price (K or X)

Expiration Date / Maturity (T)

Contract Multiplier / Lot Size

Exercise Style: American vs. European

Valuation of Options: Intrinsic Value and Time Value Decomposition: The market price of an option (the premium) is not an arbitrary figure; it is rigorously determined by competitive bidding guided by theoretical pricing models such as the Black-Scholes-Merton (BSM) formula and Cox-Ross-Rubinstein binomial models.

Intrinsic Value (IV)

Key Determinants of Option Prices: Option premiums fluctuate continuously based on six underlying market variables:

- **Spot Price of Asset (S):** Increase (uarr;); Increases (uarr;); Decreases (darr;)
- **Strike Price (K):** Increase (uarr;); Decreases (darr;); Increases (uarr;)
- **Time to Expiration (T):** Increase (uarr;); Increases (uarr;); Increases (uarr;)
- **Volatility of Asset (σ):** Increase (uarr;); Increases (uarr;); Increases (uarr;)

Theoretical Option Pricing Models: Black-Scholes-Merton and Binomial Models: The pricing of options remained an unsolved financial challenge until the early 1970s. Earlier researchers struggled because the expected return on the underlying stock entered the valuation formula, requiring subjective risk-aversion assumptions.

In-The-Money (ITM)

At-The-Money (ATM)

Put-Call Parity Theorem Arbitrage Boundaries: The Put-Call Parity relationship is a fundamental no-arbitrage equilibrium law connecting the European call price (C), European put price (P), spot price (S0), and present value of strike price (K) on identical underlying assets with identical expiration dates (T):

Reverse Conversion / Reversal (Put Overpriced)

Option Chain Analysis, Open Interest, and Put-Call Ratio (PCR): On modern electronic exchanges such as the National Stock Exchange (NSE), derivative traders analyze market sentiment and institutional positioning through the Option Chain—a real-time matrix displaying calls on the left and puts on the right for all active strike prices.

Long Call Position (Buy Call)

Short Call Position (Sell/Write Call)

Short Put Position (Sell/Write Put)

Comprehensive Payoff Matrix for Basic Positions: Assume Strike Price K = INR 2,000; Call Premium C0 = INR 80; Put Premium P0 = INR 60:

- **INR 1,800:** -INR 80 (Max Loss); +INR 80 (Max Profit); +INR 140 (Profit); -INR 140 (Loss)
- **INR 1,940:** INR 0 (BEP: 2000-60); INR 0 (BEP: 2000-60)
- **INR 2,000 (Strike):** -INR 60 (Max Loss); +INR 60 (Max Profit)
- **INR 2,080:** INR 0 (BEP: 2000+80); INR 0 (BEP: 2000+80); -INR 60 (Max Loss); +INR 60 (Max Profit)

Change in (Δ) - Directional Sensitivity

Gamma (gamma) - Curvature Change in Stability

Vega (nu;) - Volatility Sensitivity

Rho (rho;) - Interest Rate Sensitivity

Advanced Multi-Leg Option Trading Strategies: By combining options of different strikes, expirations, and types, traders can build customized payoff profiles tailored to specific market scenarios:

MODULE IV

FINANCIAL SWAPS CONTRACTS

Foundational Concepts: Meaning, Definition, and Features of Swaps: In financial engineering, a swap is formally defined as an Over-the-Counter derivative agreement between two commercial entities (or an entity and a swap dealer) to exchange streams of periodic cash payments over an established future term (tenor), calculated upon an agreed reference amount termed the Notional Principal.

Standard Financial Swap Terminology: Operational execution in global swap markets requires strict adherence to institutional parameters:

Notional Principal (N)

Reset Date / Fixing Date

Payment Dates Frequency

ISDA Master Agreement

Comprehensive Comparative Analysis: Swaps vs. Futures

- **Trading Marketplace:** ; Organized, public electronic exchanges (NSE, BSE, CME).
- **Contract Horizon:** ; Single settlement date at contract expiration (1 to 3 months typical).
- **Contract Customization:** ; Strictly standardized lot sizes, expiries, and underlying specifications.
- **Credit / Default Risk:** ; Virtually zero; guaranteed by Central Counterparty (CCP) novation.

Theoretical Valuation of Interest Rate Swaps: An interest rate swap can be valued through two equivalent theoretical paradigms: as a portfolio of two bonds or as a portfolio of forward rate agreements (FRAs).

Valuation as a Portfolio of Bonds

The Theory of Comparative Advantage in Swaps: Why do commercial enterprises enter into interest rate swaps? In addition to managing interest rate volatility, swaps allow counterparties to reduce aggregate borrowing costs by exploiting capital market credit imperfections through the Theory of Comparative Advantage.

Currency Swaps: Cross-Border Cash Flow Engineering: A Currency Swap involves an agreement to exchange cash flows denominated in two distinct sovereign currencies.

Fixed-for-Fixed Currency Swap

Fixed-for-Floating (Cross-Currency Swap)

Floating-for-Floating Currency Swap

Credit Swaps: Credit Default Swaps (CDS) and Systemic Risk: A Credit Default Swap (CDS) is the preeminent credit derivative instrument in modern capital markets. It functions as a financial insurance policy designed to transfer the credit default risk of a debt issuer (corporate or sovereign) from one market participant to another without transferring ownership of the underlying debt security.

CDS and the 2008 Global Financial Crisis: While CDS instruments provide legitimate credit hedging for banks holding commercial loans, their unmonitored expansion created catastrophic systemic fragility during the 2008 financial crisis:

- **Naked CDS Speculation:** Investors were permitted to purchase CDS protection without owning the underlying bonds, turning the market into speculative bets on corporate bankruptcy.
- Synthetic Collateralized Debt Obligations (CDOs): Wall Street investment banks created multi-billion-dollar synthetic CDOs built entirely upon portfolios of CDS contracts referencing subprime mortgage debt.

Commodity Swaps

Equity Swaps (Total Return Swaps)

Summary Synthesis

- **Interest Rate Swap (IRS):** ; Net settlement on payment dates; counterparty default risk managed by CSA.
- **Currency Swap:** ; Full gross bilateral payments; exchange rate fixed at original inception rate.
- **Credit Default Swap (CDS):** ; Triggered by ISDA credit events; cash settlement = Notional * (1 - Recovery).
- **Commodity Swap:** ; Cash-settled on periodic price averages; zero physical cargo delivery.

Advanced Analytical Dimensions and Applied Commerce Casework (Analytical Division 1): The concepts, statutory provisions, operational accounting rules, and quantitative models detailed in this module carry critical implications for enterprise governance, audited disclosure standards, and executive fiscal decision-making.

Comparative Regulatory and Practical Implementation Standards: A rigorous examination of corporate commercial practice highlights the indispensable role of standardized accounting principles.

Executive Synthesis, Governance Policy, and Continuing Professional Mastery: To conclude, mastery of the concepts examined throughout this module empowers students and commerce executives to evaluate complex fiscal data with precision, independence, and analytical clarity.

Empirical Casework: Forensic Analysis, Audit Trail Verification, and Internal Controls: Empirical accounting investigations across modern industrial enterprises illustrate that financial distortion, fraud, and misstatement rarely occur as isolated incidents; rather, they stem from structural vulnerabilities within accounting workflows, segregation-of-duties lapses, or inadequate internal audit scrutiny.

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