Marking Scheme
Derivative Market Operations (794)
Section- A

Part-I

1. **Define Derivatives**? 1
   Ans. The term 'Derivative' stands for a contract whose price is derived from or is dependent upon an underlying asset.

2. **What is Option Contract?** 1

Ans. Options give the buyer (holder) a right but not an obligation to buy or sell an asset in future. Options are of two types - calls and puts.

3. **What is the base year and base Value of Nifty index?** 1

Ans. The base value of the Nifty was set to 1000 on the start date of November 3, 1995.

4. **Can hedgers be part of derivatives market?** 1

Ans. Yes, hedgers are important for the derivative market. One of the primary purpose of derivative market was to enable the participants to take a counter position to mitigate the risk.

5. **Define Beta?** 1

Ans. Beta measures the sensitivity of stocks responsiveness to market factors. Generally, it is seen that when markets rise, most stock prices rise and vice versa. Beta measures how much a stock would rise or fall if the market rises / falls.

6. **Which derivative application consider beta to minimize the risk in cash market?** 1

Ans. Hedging, Futures can be used as a risk-management tool.

7. **What is unsystematic risk?** 1

Ans. Unsystematic risk is also called as Company Specific Risk or Diversifiable Risk.

8. **Intrinsic Value?** 1

Ans. Intrinsic value of an option at a given time is the amount the holder of the option will get if he exercises the option at that time. The intrinsic value of a call is Max[0, (S_t — K)] which means that the intrinsic value of a call is the greater of 0 or (S_t — K).

9. **Define Time Value?** 1

Ans. The time value of an option is the **difference between its premium and its intrinsic value**. Both calls and puts have time value.

10. **When Black-Scholes option pricing Model Was Developed?**

1

Ans. The Black-Scholes option pricing Model Was Developed in 1973

11. **Name 2 types of Options.** 1

Ans There are 2 types of options. The call option and the put option.

12. **Who can be a writer of an Option** 1

Ans. Any trader or a member who has sufficient money to pay as margin to sell an option either call or put, is called writer of an option.

Part-II

13. **Explain SWAP?** 1+1= 2

Ans. Swaps are private agreements between two parties to exchange cash flows in the future according to a prearranged formula. They can be regarded as portfolios of forward contracts. The two commonly used swaps are:

Interest rate swaps:

Currency swaps:

14. **Describe Free Float Market Capitalization?** 1+1=2

Ans. **Free Float Market Capitalization Weighted Index:** The free float factor (Investible Weight Factor), for each company in the index is determined based on the public shareholding of the companies as disclosed in the shareholding pattern submitted to the stock exchange by these companies[1]. The Free float market capitalization is calculated in the following manner:

Free Float Market Capitalization = Issue Size * Price * Investible Weight Factor

The Index in this case is calculated as per the formulae given below:

$$\text{Index} = \frac{\text{Free float current market capitalization}}{\text{Free Float Base Market Capitalization}} \times \text{Base Value}$$

15. **Write the difference between Forward and Future?** ½ *4= 2

Ans. Distinction between Futures and Forwards

Futures	Forwards
Trade on an organized exchange	OTC in nature
Standardized contract terms	Customised contract terms
More liquid	Less liquid
Requires margin payments	No margin payment

16. **Write the difference between Initial Margin and Mark to Market Margin**?

1+1=2

Ans. ***Initial margin:*** The amount that must be deposited in the margin account at the time a futures contract is first entered into is known as initial margin.

Marking-to-market: In the futures market, at the end of each trading day, the margin account is adjusted to reflect the investor's gain or loss depending upon the futures closing price. This is called marking-to-market.

17. **If you have bullish view in the market, how will you implement this strategy using futures?** 2

Ans. If one thinks that the market will rise meaning thereby of a bullish market, one can buy futures of NIFTY or whatever stock one holds a bullish view.

18. **What is hedging? How futures can help you, in hedging your position?** 2

Ans. The market has inbuilt risk. Howsoever good analysis of a person is about the market, many times a person may not have access to all the information and market may do exactly opposite of the position taken. In order to protect the buy or sell side of the investment or trading positions, a person can take exactly opposite position by buying or selling futures or buying or selling options. This way one can hedge or protect once positions.

19. Describe contract Specification of index option?

Ans. On NSE's index options market, there are one-month, two-month and three-month expiry contracts with minimum nine different strikes available for trading. Hence, if there are three serial month contracts available and the scheme of strikes is 6-1-6, then there are minimum 3 x 13 x 2 (call and put options) i.e. 78 options contracts available on an index. Option contracts are specified as follows: DATE-EXPIRYMONTH-YEAR-CALL/PUT-AMERICAN/ EUROPEAN-STRIKE. For example the European style call option contract on the Nifty index with a strike price of 5000 expiring on the 26th November 2009 is specified as '26NOV2009 5000 CE'.

Part-III

20. **Differentiate Trading Underlying Vs Trading Single Stock Future?1 ½ +1 ½ =**3

Ans. 1. To trade securities, one must open a security trading account with a securities broker and a demat account with a securities depository. Buying security involves putting up all the money upfront. With the purchase of shares of a company, the holder becomes a part owner of the company. The shareholder typically receives the rights and privileges associated with the security, which may include the receipt of dividends, invitation to the annual shareholders meeting and the power to vote.

2. Selling securities involves buying the security before selling it. Even in cases where short selling is permitted, it is assumed that the securities broker owns the security and then "lends" it to the trader so that he can sell it.

21. **How Future pricing take place?** 2+1=3

Ans. Pricing of futures contract is very simple. Using the cost-of-carry logic, we calculate the fair value of a futures contract. Every time the observed price deviates from the fair value, arbitragers would enter into trades to capture the arbitrage profit. This in turn would push the futures price back to its fair value. The cost of carry model used for pricing futures is given below:

$$F = Se^{rT}$$

Suitable example

22. **Write the eligibility criteria of stock for trading in derivative?** 1*3=3

Ans. ***Eligibility criteria of stocks***

- The stock is chosen from amongst the top 500 stocks in terms of average daily market capitalization and average daily traded value in the previous six months on a rolling basis.
- The stock's median quarter-sigma order size over the last six months should be not less than Rs. 10 lakhs. For this purpose, a stock's quarter-sigma order size should mean the order size (in value terms) required to cause a change in the stock price equal to one-quarter of a standard deviation.
- The market wide position limit in the stock should not be less than Rs. 300 Crores The market wide position limit (number of shares) is valued taking the closing prices of stocks in the underlying cash market on the date of expiry of contract in the month. The market wide position limit of open position (in terms of the number of underlying stock) on futures and option contracts on a particular underlying stock shall be 20% of the number of shares held by non-promoters in the relevant underlying security i.e. free-float holding.

23. **Write the requirements to become authorized person or approved user? 1*3=3**

Ans. Trading members and participants are allowed to appoint, with the approval of the F&O segment of the exchange, authorized persons and approved users to operate the

trading workstation(s). These authorized users can be individuals, registered partnership firms or corporate bodies as defined under the Companies Act, 1956.

Authorized persons cannot collect any commission or any amount directly from the clients he introduces to the trading member who appointed him. However he can receive a commission or any such amount from the trading member who appointed him as provided under regulation.

Approved users on the F&O segment have to pass a certification program which has been approved by SEBI. Each approved user is given a unique identification number through which he will have access to the NEAT system. The approved user can access the NEAT system

24. **How corporate actions adjust in derivative segment**? **1*3=3**

1. Adjustment for corporate actions shall be carried out on the last day on which a security is traded on a cum basis in the underlying cash market.
2. Adjustments shall mean modifications to positions and/or contract specifications namely strike price, position, market lot, and multiplier. These adjustments shall

   be carried out on all open, exercised as well as assigned positions.
3. The corporate actions may be broadly classified under stock benefits and cash benefits. The various stock benefits declared by the issuer of capital are bonus, rights, merger/ de–merger, amalgamation, splits, consolidations, hive–off, warrants and secured premium notes and dividends.

25. What is STT? Find STT of the following? Mr. A. sells a futures contract of M/s. XYZ Ltd. (Lot Size: 1000) expiring on 29-Sep-2005 for Rs. 300. The spot price of the share is Rs. 290. 1+2=3

Ans. Securities Transaction Tax (STT) is levied on all transactions of sale and/or purchase of equity shares and units of equity oriented fund and sale of derivatives entered into in a recognized stock exchange.

The securities transaction tax thereon would be calculated as follows:

1. Total futures contract value = 1000 x 300 = Rs. 3,00,000
2. Securities transaction tax payable thereon 0.017% = 3,00,000 x 0.017% = Rs. 51

26. **Explain Taxation of Derivative Transaction in Securities? 1*3=3**

Ans. Prior to Financial Year 2005–06, transaction in derivatives were considered as speculative transactions for the purpose of determination of tax liability under the Income-tax Act. This is in view of section 43(5) of the Income-tax Act which defined speculative transaction as a transaction in which a contract for purchase or sale of any commodity, including stocks and shares, is periodically or ultimately settled otherwise than by the actual delivery or transfer of the commodity or scrips.

Finance Act, 2005 has amended section 43(5) so as to exclude transactions in derivatives carried out in a "recognized stock exchange" for this purpose. This implies that income or loss on derivative transactions which are carried out in a "recognized stock exchange" is not taxed as speculative income or loss. Thus, loss on derivative transactions can be set off against any other income during the year. In case the same cannot be set off, it can be carried forward to subsequent assessment year and set off against any other income of the subsequent year. Such losses can be carried forward for a period of 8 assessment years.

Section- B

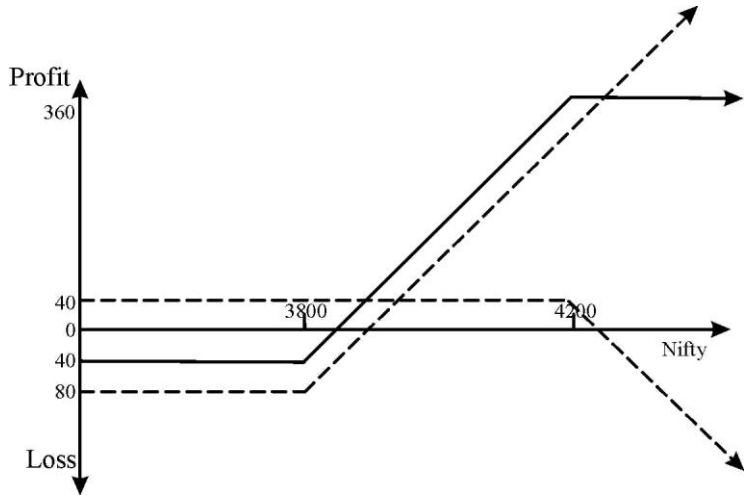
27. **Explain Bull Spread diagrammatically**? 2+3= 5

Ans. ***Bull spreads - Buy a call and sell another***

There are times when you think the market is going to rise over the next two months; however in the event that the market does not rise, you would like to limit your downside. One way you could do this is by entering into a spread. A spread trading strategy involves taking a position in two or more options of the same type, that is, two or more calls or two or more puts. A spread that is designed to profit if the price goes up is called a bull spread.

Payoff for a bull spread created using call options

The figure shows the profits/losses for a bull spread. As can be seen, the payoff obtained is the sum of the payoffs of the two calls, one sold at Rs.40 and the other bought at Rs.80. The cost of setting up the spread is Rs.40 which is the difference between the call premium paid and the call premium received. The downside on the position is limited to this amount. As the index moves above 3800, the position starts making profits (cutting losses) until the index reaches 4200. Beyond 4200, the profits made on the long call position get offset by the losses made on the short call position and hence the maximum profit on this spread is made if the index on the expiration day closes at 4200. Hence the payoff on this spread lies between -40 to 360. Somebody who thinks the index is going to rise, but not above 4200 would buy this spread. Hence he does not want to buy a call at 3800 and pay a premium of 80 for an upside he believes will not happen.



In short, it limits both the upside potential as well as the downside risk. The cost of the bull spread is the cost of the option that is purchased, less the cost of the option that is sold. It gives the profit/loss incurred on a spread position as the index changes. The payoff from the bull spread.

Broadly, we can have three types of bull spreads:

1. Both calls initially out-of-the-money.
2. One call initially in-the-money and one call initially out-of-the-money, and
3. Both calls initially in-the-money.

The decision about which of the three spreads to undertake depends upon how much risk the investor is willing to take. The most aggressive bull spreads are of type 1. They cost very little to set up, but have a very small probability of giving a high payoff.

Expiration day cash flows for a Bull spread using two-month calls

Nifty	**Buy Call 3800**	**Sell Jan 4200**	**Cash Flow**	**Profit & Loss (Rs.)**
3700	0	0	0	-40
3750	0	0	0	-40
3800	0	0	0	-40
3850	+50	0	50	+10
3900	+100	0	100	+60
3950	+150	0	150	+110
4000	+200	0	200	+160
4050	+250	0	250	+210
4100	+300	0	300	+260
4150	+350	0	350	+310
4200	+400	0	400	+360
4250	+450	-50	400	+360
4300	+500	-100	400	+360

28. **Explain salient features of Black –Scholes option pricing model? 2+3** 5

Ans. The Black-Scholes formulas for the prices of European calls and puts with strike price X on a non-dividend paying stock are the roots of the differential

$$C = SN(d_1) - X_e^{-rT} N(d_2)$$

$$P = Xe^{-rT} N(-d_2) - SN(-d_1)$$

$$\text{where } d_1 = \frac{1n\frac{S}{X} + (r + \sigma^2 / 2)T}{\sigma\sqrt{T}}$$

$$\text{and } d_2 = d_1 - \sigma\sqrt{T}$$

- N(x) is the cumulative distribution function for a standardized normal distribution.
- The expression $N(d_2)$ is the probability that the option will be exercised in a risk neutral world, so that $N(d_2)$ is the strike price times the probability that the strike price will be paid.
- $Sigma_{annual} = sigma_{daily} \times \sqrt{}$ *Number of trading days per year. On an average there are 250 trading days in a year.*
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29. **Explain Greeks of Option contract?** 1*5= 5

Ans. Each Greek letter measures a different dimension to the risk in an option position. These are used by traders who have sold options in the market. Aim of traders is to manage the Greeks in order to manage their overall portfolio.

Delta (Δ)

In general delta (Δ) of a portfolio is change in value of portfolio with respect to change in price of underlying asset. Delta of an option on the other hand is rate of change of the option price with respect to price of the underlying asset.

The Δ of a call is always positive and the Δ of a put is always negative. As the stock price (underlying asset) changes delta of the option also changes. In order to maintain delta at the same level a given number of stocks (underlying asset) need to be bought or sold in the market. Maintaining delta at the same level is known as delta neutrality or delta hedging.

Gamma (Γ)

Γ is the rate of change of the option's Delta A with respect to the price of the underlying asset. In other words, it is the second derivative of the option price with respect to price of the underlying asset.

Theta (Θ)

Θ of a portfolio of options, is the rate of change of the value of the portfolio with respect to the passage of time with all else remaining the same. Θ is also referred to as the *time decay* of the portfolio. Θ is the change in the portfolio value when one day passes with all else remaining the same. We can either measure Θ "per calendar day" or "per trading day". To

obtain the per calendar day, the formula for *Theta* must be divided by 365; to obtain *Theta* per trading day, it must be divided by 250.

Vega (ν)

The vega of a portfolio of derivatives is the rate of change in the value of the portfolio with respect to volatility of the underlying asset. If ν is high in absolute terms, the portfolio's value is very sensitive to small changes in volatility. If ν is low in absolute terms, volatility changes have relatively little impact on the value of the portfolio.

Rho (ρ) The ρ of a portfolio of options is the rate of change of the value of the portfolio with respect to the interest rate. It measures the sensitivity of the value of a portfolio to interest rates.

30. **Describe Corporate Hierarchy?** **1*5=5**

Ans. ***Corporate hierarchy*** In the F&O trading software, a trading member has the facility of defining a hierarchy amongst users of the system. This hierarchy comprises corporate manager, branch manager dealer and admin.

- ***Corporate manager:*** The term is assigned to a user placed at the highest level in a trading firm. Such a user can perform all the functions such as order and trade related activities of all users, view net position of all dealers and at all clients level, can receive end of day consolidated trade and order reports dealer wise for all branches of the trading member firm and also all dealers of the firm. Only a corporate manager can sign off any user and also define exposure limits for the branches of the firm and its dealers.
- ***Branch manager:*** This term is assigned to a user who is placed under the corporate manager. Such a user can perform and view order and trade related activities for all dealers under that branch.
- ***Dealer:*** Dealers are users at the bottom of the hierarchy. A Dealer can perform view order and trade related activities only for oneself and does not have access to information on other dealers under either the same branch or other branches.
- ***Admin:*** Another user type, 'Admin' is provided to every trading member along with the corporate manager user. This user type facilitates the trading members and the clearing members to receive and capture on a real-time basis all the trades, exercise requests and give up requests of all the users under him. The clearing members can receive and capture all the above information on a real time basis for the members and participants linked to him.

31. **Draw Table of Contract Specification of stock future and stock option?**

2 ½ +2 ½ = 5

Ans. **Contract specification of Stock futures**

Underlying	Individual securities

Exchange of trading	National Stock Exchange of India Limited
Security descriptor	FUTSTK
Contract size	As specified by the exchange (minimum value of Rs.2 lakh)
Price steps	Re. 0.05
Price bands	Operating range of 20% of the base price
Trading cycle	The futures contracts will have a maximum of three month trading cycle - the near month (one), the next month (two) and the far month (three). New contract will be introduced on the next trading day following the expiry of near month contract.
Expiry day	The last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.
Settlement basis	Mark to market and final settlement will be cash settled on T+1 basis.
Settlement price	Daily settlement price will be the closing price of the futures contracts for the trading day and the final settlement price shall be the closing price of the underlying security on the last trading day.

Contract specification of Stock options

Underlying	**Individual securities available for trading in cash market**
Exchange of trading	National Stock Exchange of India Limited
Security descriptor	OPTSTK
Style of option	European
Strike price interval	As specified by the exchange
Contract size	As specified by the exchange (minimum value of Rs.2 lakh)
Price steps	Re. 0.05
Price bands	Not applicable

Trading cycle	The options contracts will have a maximum of three month trading cycle - the near month (one), the next month (two) and the far month (three). New contract will be introduced on the next trading day following the expiry of near month contract.
Expiry day	The last Thursday of the expiry month or the previous trading day if the last Thursday is a trading holiday.
Settlement basis	Daily settlement on T+1 basis and final option exercise settlement on T+1 basis
Daily settlement price	Premium value (net)
Final settlement price	Closing price of underlying on exercise day or expiry day
Settlement day	Last trading day

32. **Explain NSCCL-SPAN? ½ *10=** 5

Ans. ***NSCCL-SPAN***

The objective of NSCCL-SPAN is to identify overall risk in a portfolio of all futures and options contracts for each member. The system treats futures and options contracts uniformly, while at the same time recognizing the unique exposures associated with options portfolios, like extremely deep out-of-the-money short positions and inter-month risk. Its over-riding objective is to determine the largest loss that a portfolio might reasonably be expected to suffer from one day to the next day based on 99% VaR methodology.

Risk arrays

The SPAN risk array represents how a specific derivative instrument (for example, an option on NIFTY index at a specific strike price) will gain or lose value, from the current point in time to a specific point in time in the near future, for a specific set of market conditions which may occur over this time duration.

In the risk array, losses are represented as positive values, and gains as negative values. Risk array values are represented in Indian Rupees, the currency in which the futures or options contract is denominated.

Risk scenarios

The specific set of market conditions evaluated by SPAN, are called the risk scenarios, and these are defined in terms of:

SPAN further uses a standardized definition of the risk scenarios, defined in terms of:

1. The underlying price scan range or probable price change over a one day period, and

2. The underlying price volatility scan range or probable volatility change of the underlying over a one day period.

Scanning risk charge

As shown in the table giving the sixteen standard risk scenarios, SPAN starts at the last underlying market settlement price and scans up and down three even intervals of price changes (price scan range). At each price scan point, the program also scans up and down a range of probable volatility from the underlying market's current volatility (volatility scan range). SPAN calculates the probable premium value at each price scan point for volatility up and volatility down scenario. It then compares this probable premium value

to the theoretical premium value (based on last closing value of the underlying) to determine profit or loss.

Calendar spread margin

A calendar spread is a position in an underlying with one maturity which is hedged by an offsetting position in the same underlying with a different maturity: for example, a short position in a July futures contract on Reliance and a long position in the August futures contract on Reliance is a calendar spread. Calendar spreads attract lower margins because they are not exposed to market risk of the underlying. If the underlying rises, the July contract would make a loss while the August contract would make a profit.

Short option minimum margin

Short options positions in extremely deep-out-of-the-money strikes may appear to have little or no risk across the entire scanning range. However, in the event that underlying market conditions change sufficiently, these options may move into-the-money, thereby generating large losses for the short positions in these options. To cover the risks associated with deep-out-of-the-money short options positions, SPAN assesses a minimum margin for each short option position in the portfolio called the short option minimum charge, which is set by the NSCCL. The short option minimum charge serves as a minimum charge towards margin requirements for each short position in an option contract.

Net option value

The net option value is calculated as the current market value of the option times the number of option units (positive for long options and negative for short options) in the portfolio.

Net option value is added to the liquid net worth of the clearing member. This means that the current market values of short options are deducted from the liquid net worth and the market values of long options are added thereto. Thus mark to market gains and losses on option positions get adjusted against the available liquid net worth.

Net buy premium

To cover the one day risk on long option positions (for which premium shall be payable on T+1 day), net buy premium to the extent of the net long options position value is deducted from the Liquid Net worth of the member on a real time basis. This would be applicable only for trades done on a given day. The net buy premium margin shall be released towards the Liquid Net worth of the member on T+1 day after the completion of pay-in towards premium settlement.

Overall portfolio margin requirement

The total margin requirements for a member for a portfolio of futures and options contract would be computed by SPAN as follows:

1. Adds up the scanning risk charges and the calendar spread charges.
2. Compares this figure to the short option minimum charge and selects the larger of the two. This is the SPAN risk requirement.
3. Total SPAN margin requirement is equal to SPAN risk requirement less the net option value, which is mark to market value of difference in long option positions and short option positions.
4. Initial margin requirement = Total SPAN margin requirement + Net Buy Premium.

33. NSCCL has developed a comprehensive risk containment mechanism for the F&O segment. Describe it? 1*5=5

Ans. NSCCL has developed a comprehensive risk containment mechanism for the F&O segment. Risk containment measures include capital adequacy requirements of members, monitoring of member performance and track record, stringent margin requirements, position limits based on capital, online monitoring of member positions and automatic disablement from trading when limits are breached. The salient features of risk containment mechanism on the F&O segment are:

There are stringent requirements for members in terms of capital adequacy measured in terms of net worth and security deposits.

1. NSCCL charges an upfront initial margin for all the open positions of a CM. It specifies the initial margin requirements for each futures/options contract on a daily basis. The CM in turn collects the initial margin from the TMs and their respective clients.
2. Client margins: NSCCL intimates all members of the margin liability of each of their client. Additionally members are also required to report details of margins collected from clients to NSCCL, which holds in trust client margin monies to the extent reported by the member as having been collected from their respective clients.
3. The open positions of the members are marked to market based on contract settlement price for each contract. The difference is settled in cash on a T+1 basis.
4. NSCCL's on-line position monitoring system monitors a CM's open positions on a

real-time basis. Limits are set for each CM based on his capital deposits. The on-line position monitoring system generates alerts whenever a CM reaches a position limit set up by NSCCL. At 100% the clearing facility provided to the CM shall be withdrawn. Withdrawal of clearing facility of a CM in case of a violation will lead to withdrawal of trading facility for all TMs and/ or custodial participants clearing and settling through the CM

5. CMs are provided a trading terminal for the purpose of monitoring the open positions of all the TMs clearing and settling through him. A CM may set exposure limits for a TM clearing and settling through him. NSCCL assists the CM to monitor the intra-day exposure limits set up by a CM and whenever a TM exceeds the limits, it stops that particular TM from further trading. Further trading members are monitored based on positions limits. Trading facility is withdrawn when the open positions of the trading member exceeds the position limit.