Assignment – Chapter 9 – Derivatives Analysis and Valuation

Question 1

Mr. X, is a Senior Portfolio Manager at ABC Asset Management Company. He expects to purchase a portfolio of shares in 90 days. However, he is worried about the expected price increase in shares in coming day and to hedge against this potential price increase he decides to take a position on a 90-day forward contract on the Index. The index is currently trading at 2290. Assuming that the continuously compounded dividend yield on the same index is 1.75% and risk-free rate of interest is 4.16%, you are required to determine:

(a) The justified forward price on this contract.

(b) The position Mr. X should take in forward contract on the Index.

(c) Gain/ loss on the position taken if after 28 days of the purchase of the contract the Index value stands at 2450.

(d) Gain/ loss on the position taken if at expiration of 90 days the Index Value is 2470.

Note: Take 365 days in a year and value of $e^{0.005942}$ = 1.005960, $e^{0.001849}$ = 1.001851.

Question 2

On January 1, 2023 an investor has a portfolio of 5 securities as given below:

Security	Price (Rs.)	No. of shares	Beta
A	612.65	3000	?
B	334.20	5000	1.15
C	454.45	6000	0.40
D	775.10	10000	0.95
E	781.05	3000	0.85

Portfolio beta is 0.859

The cost of capital to the investor is 10.5% p.a.

You are required to calculate:

(i) The beta of Security A.

(ii) The theoretical value of the Nifty futures for February, 2023. Current value of Nifty 6500.

(iii) The number of contract of Nifty the investor needs to sell to get a full hedge until February, for his portfolio, if the current value of Nifty is 6500 and Nifty futures have a minimum trade lot requirement of 200 units. Assume that the Futures are trading at their fair value.

(iv) What will be new beta if 4 Future contracts are sold to the investors?

No. of days in a year be traded as 365 days

Given: ln (1.105) = 0.0998, $e.^{0.015858}$ =1.01598 and $e^{0.01668}$=1.01682

Question 3

Mohan buys 10,000 shares of X Ltd. @ ₹ 25 per share whose beta value is 1.5 and sells 5,000 shares of A Ltd. @ ₹ 40 per share having a beta value of 2. He obtains a complete hedge by buying 25 Nifty Futures. He closes out his position at the closing price of the next day when the share of X Ltd. has fallen by 4% and Nifty Futures has dropped by 2.50%. In the process he suffered a loss of ₹ 16625.

You are required to determine

(i) The value of the Nifty future

(ii) Initial cash outlay

(iii) Cash inflow at the close out

(iv) Percentage Gain/loss to Shares of A Ltd. at the time of closure

Question 4

Mr. H is holding 100 equity shares of V Ltd. which is being quoted at ₹ 2,100 per share. He is interested in hedging downside risk of his holding as he is going to sell them after 2 months. A 2-month Call option is available at a premium of ₹ 60 per share and a 2-month put option is available at a premium of ₹ 50 per share. The strike price in both cases is ₹ 2,200. You are required to:

(i) Suggest the position Mr. H should take in the option market to hedge his holding in the V Ltd.

(ii) Calculate his final position if after 2 months i.e., on the day of exercise the actual market price of per share of V Ltd. happens to be ₹ 2000, ₹ 2100, ₹ 2200, ₹ 2300 and ₹ 2400.

Question 5

Based on the following information, choose the correct answer from the following questions:

Situation	Action	Exercise Price	Premium	Spot Price
I	Exercised	140	20	160
II	Exercised	200	15	175
III	Lapsed	300	25	400

From the information given above, choose the correct answer to the Question no. I to III:

I. In Situation III, the investor's position and the amount of profit / loss is:

A. Put option, ₹ (25)

B. Call option, ₹ 75

C. Short position, ₹ 100

D. Long position, ₹ (100)

II. In Situation I, the investor's position and the amount of profit or loss is :

A. Put option and ₹ 20

B. Call option and ₹ 0

C. Put option and ₹ 0

D. Call option and ₹20

III. In Situation II, the investor's position and the amount of profit / loss is :

A. Put option and ₹ 10

B. Call option and ₹ 10

C. Put option and ₹ 25

D. Call option and ₹ 25

Question 6

The market received some information about ABC Lad's tie up with a Multinational Company. This has induced the market price to move up. If the information is false, the ABC Ltd's stock price will probably fall dramatically. To protect from this, an investor has bought the call and put options.

He purchased one 3 month's call with a striking price of ₹ 45 for ₹ 3 premium and paid ₹ 2 per share premium for a 3 month's put with a striking price of ₹ 42.

Assume 100 shares for call and put option.

You are required:

(i) To determine the investor's position if the tie up offer bids the price of ABC Ltd.'s stock up to ₹ 44 in 3 months.

(ii) To determine the investor's position of the tie up offer program fails and the price of the stocks falls to ₹ 34 in 3 months.

(iii) To determine the investor's position if the tie up offer program is successful and the price of the stocks rise up to ₹ 46 in 3 months.

Question 7

AB Ltd.'s equity shares are presently selling at a price of ₹ 500 each. An investor is interested in purchasing AB Ltd.'s shares. The investor expects that there is a 70% chance that the price will go up to ₹ 650 or a 30% chance that it will go down to ₹ 450, three months from now. There is a call option on the shares of the firm that can be exercised only at the end of three months at an exercise price of ₹ 550.

Calculate the following:

(i) If the investor wants a perfect hedge, what combination of the share and option should he select?

(ii) Explain how the investor will be able to maintain identical position regardless of the share price.

(iii) If the risk-free rate of return is 20% p.a. for the three months period, what is the value of the option at the beginning of the period?

(iv) What is the expected rate of return for the option buyer?

Question 8

Mr. S has a portfolio of ₹ 50 lacs which he wants to invest in share market with rebalancing target after every 15 days to start with for a period of one month from now. The present NIFTY is 17025. The minimum NIFTY within a month can at most be 15322.50. He wants to know as to how he should rebalance his portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:

(a) Immediately to start with.

(b) 15 days later-being the 1st day of rebalancing if NIFTY falls to 16321.89.

(c) 15 days further from the above date if the NIFTY touches 17512.14.

Note: 1. Assume that the value of his equity component will change in tandem with that of the NIFTY.

2. Round off calculations upto whole numbers.