CA FINAL

AFM

PRACTICE BOOKLET

Sample Notes

Curated By:-

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(AIR 2 – CA Foundation, AIR 4 – CA Inter, AIR 24 – CA Final)

ABOUT

CA VINOD KUMAR AGARWAL

(AIR-2nd, 4th & 24th IN FOUNDATION, INTER & FINAL RESPECTIVELY)

SUMMARY

Founder Member of A.S. Foundation, India's Leading Academy for C.A. Course, CA Vinod Kumar Agarwal is a fellow member of ICAI and a past member of the Board of Studies, ICAI. With a teaching experience of twenty years, he has guided more than 1,00,000 students and is ranked as one of the best teachers for Accounts and Financial Management at Intermediate level and Financial Reporting and SFM at Final Level.

He has authored books on Accounts, Advanced Auditing for CA Final, Auditing for Intermediate, Accounting Standards, Ind AS, Costing and Financial Management, and his books have sold more than 2,00,000 copies.

PUBLICATIONS AND ACHIEVEMENTS

- A merit holder in all the three levels of exams conducted by ICAI (2nd rank, 4th rank, and 24th rank in CA Foundation, CA Intermediate and CA Final respectively).
- Scored 99 marks in Accountancy in CA Foundation.
- Authored books on Accounts, Advanced Auditing for CA Final, Auditing for Intermediate, Accounting Standards, Ind AS, Costing and Financial Management.
- Complied a book "No Truth, Only Interpretations", a book on motivation, inspiration and guidance.
- Compiled a book, "Mind Candy", a book on motivation.
- Compiled a book, "Sweet Voice", a book on inspirational quotes.
- Working experience with India's top firms Firms like M/s. S.B. Billimoria and A.F. Ferguson (both member firm of Deloitte).
- Published article in the Students Newsletter of ICAI on "Valuation of Equity Shares" and "Stock Market Index".
- Presented a paper on "Corporate Governance and Role of Auditor" in National Students Conference held in Goa.

EDUCATION

- Passed the Certified Public Accountant (CPA) (USA) exam in 2007.
- Post-graduation from Pune University with First Class.
- Graduation from B.M.C.C, Pune with distinction.
- Passed the Diploma in Business Finance Conducted by ICFAI, Hyderabad.
- Passed the Derivative Module test conducted by National Stock Exchange.
- Also appeared for UPSC exam and cleared Mains twice.

TEACHING EXPERIENCE

- Teaches Accounts, Advanced Accountancy, Financial management and Economics for Finance at CA Intermediate Level and Financial Reporting and Advanced Financial Management (AFM) at CA Final level.
- Pioneer of creating and distributing video tutorials in pen drives/google drive among students.
- Produced All India Toppers (1st Rank) in CPT examination and final examination apart from more than 250 all India merit- holders.
- More than 30000 Facebook subscribers, more than 42000 YouTube subscribers.
- Sold more than 40000 video lectures in pen-drive and google-drive mode.
- In 2019, launched a brand VKNOW, to become a national brand for digital learning.

TEACHING APPROACH

- Simple and effective way of teaching through concept building, class-room practice, home-exercise, and power-point presentation.
- A large variety of problems are solved in the class to meet the examination requirements.
- Notes are updated frequently covering amendments and exam problems.

UNIT – IV – DERIVATIVES OPTIONS

THEORY

1. MEANING OF OPTION-

- An option is the right but not the obligation to enter into a transaction.
- An option is the right, but not the obligation, to buy or sell something at a stated date at a stated price.

2. CALL OPTION

A call option provides to the holder a **right to buy** specified assets at specified price on or before a specified date.

3. PUT OPTION

A put option provides to the holder **a right to sell** specified assets at specified price on or before a specified date.

4. BUYERS AND SELLERS OF OPTION CONTRACT:

➢ Buyer and Seller is determined from the view point of right.

➢ The person who has a right under a contract is known as Buyer. The right may be Right to Buy [Call Buyer] or right to Sell [Put Buyer].

5. EXPECTATION OF VARIOUS PARTY IN OPTION MARKET:

Long Call:	Person buying a Call option	They expects Price to increase
Long Put:	Person buying a Put option	They expects Price to Decrease
Short Call:	Person selling a Call option	They expects Price to Decrease
Short Put:	Person selling a Put option	They expects Price to Increase

6. IN / OUT / AT THE MONEY OPTION-FOR CALL

Market Scenario	For Holder or Buyer Of Call Option
Money Price > Strike Price	In the Money
Market Price < Strike Price	Out of the Money
Market Price = Strike Price	At the Money

Note: The above position is reversed for the Writer of the Option.

Note: For finding In/Out/At the money Option, Premium is ignored as it is considered as sunk cost.

7. IN / OUT / AT THE MONEY OPTION-FOR PUT

Market Scenario	For Holder or Buyer Of Call Option
Money Price > Strike Price	Out of the Money
Market Price < Strike Price	In the Money
Market Price = Strike Price	At the Money

Note: The above position is reversed for the Writer of the Option.

Note: For finding In/Out/At the money Option, Premium is ignored as it is considered as sunk cost.

8. PAY OFF / PROFIT & LOSS OF CALL OPTION:

Pay off means Profit and Loss. In determining the profit and loss we take into consideration the amount of premium.

Call Option:

Profit: When Market Price > Strike Price

In such case he will exercise the Option. Profit = Actual Market Price – Strike Price Premium

Loss: When Market Price < Strike Price

In such case he will not exercise the option. Loss = Amount of Premium Paid

Note: Position of Call Seller will just be opposite of Position of Call Buyer.

9. PAY OFF / PROFIT & LOSS OF PUT OPTION:

Pay off means Profit and Loss. In determining the profit and loss we take into consideration the amount of premium.

Put Option:

Profit: When Market Price < Strike Price

In such case he will exercise the option. Profit = Strike Price – Current Market Price – Premium

Loss: When Market Price > Strike Price

In such case he will not exercise the Option. Loss = Amount of Premium Paid.

10. MAXIMUM & MINIMUM PROFIT & LOSS

FOR CALL BUYER	FOR CALL SELLER
Maximum Profit = Unlimited	Maximum Profit = Amount Of Premium Received
Maximum Loss = Amount Of Premium Paid	Maximum Loss = Unlimited
FOR PUT BUYER	**FOR PUT SELLER**
Maximum Profit + Strike Price – Premium Paid	Maximum Profit = Amount Of Premium Received
Maximum Loss = Amount of Premium Paid	Maximum Loss = Strike Price – Premium Paid

11. BREAK EVEN PRICE OF CALL

Breakeven price is the market price at which the option parties neither makes a profit nor incur any losses.

Break-Even Market Price for Buyer and Seller of Call Option: Exercise Price + Premium

12. BREAK EVEN PRICE OF PUT OPTION

Breakeven prices is the market price at which the option parties neither makes a profit not incur any losses.

Break-Even Market Price for Buyer and Seller of Put Option: Exercise Price - Premium

13. POSITION TO BE TAKEN IN OPTION MARKET

Expectation	Call	Put
If Expected Market Price > Strike Price or If Market Will go up	Buy Call	Sell Call
If Expected Market Price < Strike Price or If Market will go down	Sell Call	Buy Put
If Expected Market Price = Strike Price or If Market will remain same	No action	No Action

14. INTRINSIC VALUE AND TIME VALUE OF OPTION

Option Premium is the component of two parts: Intrinsic Value + Time Value of Money i.e. OP – IV + TVM

Intrinsic Value

❖ It can't be negative (always equal to or greater than zero).

❖ Intrinsic Value of Call Option = maximum of (0, Current Market Price – Exercise Price);

❖ Intrinsic Value of Put Option = Maximum of (0, Exercise Price – Current Market Price).

Time Value of Option:

❖ Time Value of Option is the amount by which the option price exceeds the Intrinsic Value. i.e. TVM = OP-IV

❖ On the expiration date, the time value of option is zero and the premium is entirely represented by the Intrinsic Value.

15. VALUE OF CALL OPTION ON EXPIRY DATE

= Higher of [(S – E), 0]

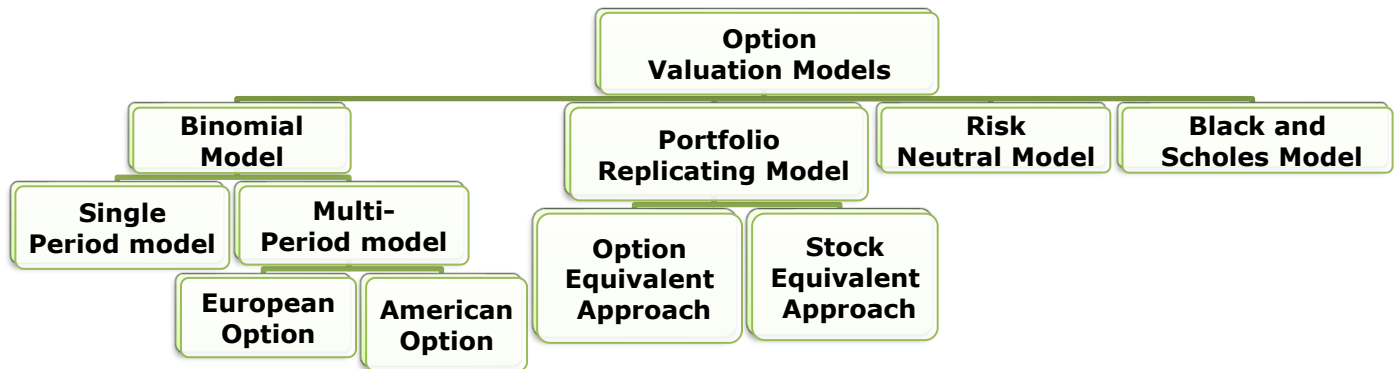## 16. VALUE OF PUT OPTION ON EXPIRY DATE

= Higher of [(E – S), 0]

17. PUT CALL PARITY THEORY

It states that there exists some relationship between value of the call Option & value of the put option

- ❖ Put call Parity Theorem = S + P = C + PV of E
- ❖ Value of Put using Put call Parity Theorem , P = C + PV of E – S
- ❖ Value of Call using Put call Parity Theorem, C = S + P – PV of E

18. OPTION VALUATION MODELS

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                        │     Option       │
                        │ Valuation Models │
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- Binomial Model
  - Single Period model
  - Multi-Period model
    - European Option
    - American Option
- Portfolio Replicating Model
  - Option Equivalent Approach
  - Stock Equivalent Approach
- Risk Neutral Model
- Black and Scholes Model

19. BINOMINAL MODEL

Step 1 - Option Delta $= \dfrac{\text{Difference in option values}}{\text{Difference in Share Prices}}$

Option Delta $= \dfrac{C_2 - C_1}{S_2 - S_1}$

Where, C_2 = Value of the call option if the share price is S_2

  C_1 = Value of the call option if the share price is S_1.

Step 2 – Calculate Portfolio Value on Expiry

Step 3 – Calculate PV of portfolio

Step 4 – Value of call = PV of Share – PV of Portfolio

20. RISK NEUTRAL MODEL

❖ Calculation of Probability

Expected Return = (Probability of Price increase) x % Increase in price + (1 – Prob. of price decrease) x % decrease in price = risk-free rate.

❖ Value of call = PV of expected value = Prob x option value on expiry.

21. PORTFOLIO REPLICATING MODEL

Case -1: Stock equivalent approach

Situation-1 - Option Finishing only in the money

$Co = So - \dfrac{E}{e^{rt}}$

Where, So = Current market price

Situation-2 -Option Finishing out of the Money

Step-1 - Calls to be bought $= \dfrac{\text{Spread in stock prices}}{\text{Spread in call option values}}$

Step-2 – So = PV of Lower Stock Price + Calls bought x Co

Case-2 – Option Equivalent Approach

Step-1 $= \dfrac{C_1 - C_2}{S_1 - S_2}$

Step-2 PV of Borrowing (B) $= \dfrac{N(\Delta S_2 - C_2)}{e^{rt}}$

Step-3 Co = N x Δx S – B

Where,

C_1	=	Value of call if the share price is S_1
C_2	=	Value of call if the share price is S_2
N	=	No. of call option
B	=	Borrowing
R	=	rate of interest

22. BLACK – SCHOLES MODEL

Black and Scholes model is based on the following assumptions –

1. The rate of return on a share are log normally distributed. (The logarithm of Stock's return will follow normal distribution)
2. The risk free rate is constant during the life of the option and is known.
3. The Market is efficient and there is no transaction costs and taxes.
4. The call option is an European option.
5. There are no restrictions or penalties for short selling.
6. The stock price is continuous and random.
7. There is no dividend to be paid on share during the life of the option.

The Black – Scholes formula calculates the price of a call option to be :

$C = S\,N(d_1) - E e^{-rT}\,N(d_2)$

$P = E.\,e^{-rt}N(-d_2) - S.N.(-d_1)$

Where $\ d1 = \dfrac{\ln(S/E) + (r + \sigma^2/2)\,T}{\sigma\sqrt{T}}$

d_2	=	$d_1 - \sigma\sqrt{T}$
C	=	price of the call option
S	=	price of the underlying stock
E	=	option exercise price
r	=	risk-free interest rate
T	=	current time until expiration
N (d)	=	area under the normal curve
I_n	=	Natural log
P	=	Price of the option

23. THEORETICAL MINIMUM PRICE (LOWER LIMIT) OF EUROPEAN CALL OPTION

$C_0 = S - E.e^{-rt}$

24. THEORETICAL MINIMUM PRICE (LOWER LIMIT) OF EUROPEAN PUT OPTION

$P_0 = E.e^{-rt} - S$

25.   FACTORS AFFECTING OPTION VALUATION (OPTION PREMIUM)

Factor		Call		Put	Explanation
Stock Price	Increase	▲	For a given strike price(55) increase in the stock price (60,70,80) increases the demand for call hence higher premium and vice-versa	▼	For a given strike price(55) increase in the stock price(30,40,50) decreases the demand for put hence lower premium and vice-versa
	Decrease	▼		▲	
Exercise Price	Increase	▼	For a given stock price (55) increase in the strike price (30,40,50) decreases the demand for call hence lower premium and vice-versa	▲	For a given stock price (55) increase in the strike price (60,70,80) increases the demand for put hence higher premium and vice-versa
	Decrease	▲		▼	

Time to Expira-tion	More	▲	More the time to expiry, more are the chances for Option to be In The Money, hence higher premium & vice-versa	▲	More the time to expiry, more are the chances for Option to be In The Money, hence higher premium & vice-versa
	Less	▼		▼	
Volatility	More	▲	More the volatility, more are the chances for Option to be In The Money, hence higher premium & vice-versa	▲	More the volatility, more are the chances for Option to be In The Money, hence higher premium & vice-versa
	Less	▼		▼	
Interest Rate	Increase	▲	Increase in interest rate increases the interest income that can be earned on money saved in buying call option, which increases demand for call and premium thereon	▲	Increase in interest rate increases the opportunity cost of interest income on put option which decreases demand for put and premium thereon (however less practical)

26. OPTIONS GREEKS

Greeks	Symbol	Represents	Formula,
Delta	δ	Delta represents the change in the Option value with Rs 1 change in the Stock Price	$Delta\ (\delta\ ) = \dfrac{\Delta V_0}{\Delta S_0}$
Gamma	γ	Gamma represents the change in the Options Delta with Rs 1 change in the Stock Price	$Gamma\ (\gamma) = \dfrac{\Delta V_\gamma}{\Delta S_0}$
Rho	ρ	Rho represents the change in the Options Value with 1% change in the Interest Rates	$Rho\ (\rho) = \dfrac{\Delta V_0}{\Delta_r}$
Theta	θ	Theta represents the change in the Options Value with 1 day change in the time to expiry	$Thetao\ (\theta) = \dfrac{\Delta V_0}{\Delta_t}$
Vega	ν	Vega represents the change in the Options Value with 1% change in the volatility of the stock	$Vega\ (\vartheta) = \dfrac{\Delta V_0}{\Delta_\sigma}$

Where,

V_0 = value of the option,

S_0 = Spot price of the stock,

R = rate of Interest,

T = time to expiration

PROBLEMS & SOLUTION

PROBLEM 1 :

Consider the following information with regard to a call option on the stock of AB Corp.

Details		
	Current share price	Rs. 67
	Exercise price	Rs. 65
	Time Period	3 months
	Standard deviation of CCRFI	0.6
	CCRFI	8%

- *Compute the value of the call using Black-Scholes model.*
- *What would be the value of the put?*
- *If this call option is priced at Rs. 7.50 what investment strategy would you adopt?*
- *If this put option is available in the market at Rs. 7 what investment strategy would you adopt?*

SOLUTION 1 :

	Term	Calculation	Result
1.	So	Given	67
2.	EGiven	65	
3.	PV of EP	$E \times e^{-rt} = 65 \times e^{-0.08 \times 0.25} = 65 \times 0.98020$	63.713
4.	$NL\left(\dfrac{So}{E}\right)$	$NL\left(\dfrac{67}{65}\right) = NL\ (1.0308)$	0.2956

5. d1

$$d1 = \frac{\left[\log_e\left(\dfrac{S_O}{E}\right) + (r + 0.5 \times \sigma^2) \times t\right]}{\sigma \times \sqrt{t}}$$

$$= \frac{0.02956 + 0.065}{0.3} \qquad\qquad 0.3152$$

6. d2

$$d2 = \frac{\left[\log_e\left(\dfrac{S_O}{E}\right) + (r + 0.5 \times \sigma^2) \times t\right]}{\sigma \times \sqrt{t}}$$

$$= \frac{0.02956 - 0.025}{0.3} \qquad\qquad 0.0152$$

7. Nd1 :

Cumulative value = 0.5 + 0.1217 = 0.6217

8. Nd2 :

Cumulative value = 0.50 + 0.0080 = 0.5080

9. $c = [S_0 \times N(d_1)] - [E \times e\text{-}rt \times N(d_2)]$

= (67 × 0.6217) − (63.713 × 0.508) = 41.654 − 32.366 = 9.288.

10. Put price = $(C + PV\ of\ EP - S_0)$

i.e. 9.288 + 63.713 − 67 = 6.001

Strategy

Option	Actual option price	Fair option price	Valuation	Decision
Call	7.50	9.288	Under	Buy call option
Put	7.00	6.001	Over	Sell put option

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PROBLEM 2 :

From the following data for certain stock, find the value of a call option :

Price of stock now	=	*Rs. 80*
Exercise price	=	*Rs. 75*
Standard deviation of continuously		
compounded annual return	=	*0.40*
Maturity period	=	*6 months*
Annual interest rate	=	*12%*

Number of S.D. from Mean (z)	Area of the left or right (one tail)
0.25	*0.4013*
0.30	*0.3821*
0.55	*0.2912*
0.60	*0.2578*

$e^{0.12 \times 0.05}$ = *1.0060*

In 1.0667 = 0.0645   **(Study Material + Nov. 2006 - 8 Marks)**

SOLUTION 2 :

Term	Computation	Result	
A	Spot	Given	80
B	EP	Given	75
C	PV of EP	75 x 0.94176	70.632
D	NL (Spot / EP)	80/75 = 1.07	0.0645
E	d1	[NL (80/75) + (0.12 + 0.5 * 0.4 * 0.4) x 0.5] / [0.4 * SQRT(0.5)]	0.582
F	d2	[NL (80/75) + (0.12 - 0.5 * 0.4 * 0.4) x 0.5] / [0.4 * SQRT(0.5)]	0.298
G	Nd1	Cum area in normal distribution curve mandated at d1	0.719
H	Nd2	Cum area in normal distribution curve mandated at d2	0.6141
	Call	(a x g) – (c x h)	14.14489

Note : For Nd1 and Nd2, the values have been taken from tables since the figures given in the question.

Do not appear to be right.

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PROBLEM 3 :

XYZ Company's share price is now Rs. 60. Six months hence, it may be either Rs. 75 with probability 0.70 or Rs. 50 with probability 0.30. A call option exists on the stock that can be exercised only at end of 6 months at an exercise price of Rs. 65.

a. If you wish to establish a perfectly hedged position, what would you do on the basis of the facts just presented?

b. Under each of the two possibilities, what will be the value of your hedged position?

c. What is the expected value of option price at the end of the period?

SOLUTION 3 :

a. Hedge Ratio = $\dfrac{\text{Difference in option value at the expiration}}{\text{Difference in share at expiration}}$

$= \dfrac{10 - 0}{75 - 50}$ = 0.40 share per call option written.

b. Value of portfolio under hedged position

Stock Price	Value of long Position in share	Value of short position in option	Value of combined hedge position
75	0.4 x 75 = 30	- 10	20
50	0.4 x 75 = 20	0	20

c. Value of option

Stock Price	Probability	Value of option	Expected value of option
75	0.70	10	7
50	0.30	0	0
			Rs. 7

Value of call option at expiration = Rs. 7.

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PROBLEM 4 :

RJS purchased a three-month call option on a company's share, with an exercise price of Rs. 97. The current market price is Rs. 100. The CCRFI is 12%. What is the value of the call option, if the share price moves to Rs. 90 or to Rs. 108. Provide your answer, adopting the risk neutral approach.

SOLUTION 4 :

Price may fall from Rs. 100 to Rs. 90; Percentage fall being 10%

Price may rise from Rs. 100 to Rs. 108; Percentage rise being 8%

a. If Investors are indifferent to risk, the expected return on RJS share should be the same as the Risk free rate of return viz, 12% (3% for three-month period). Therefore, the expected return is

= (P of rise x 8%) + (1 – P of rise) x (-10%)

= (0.09 x – 0.1 + 0.1 x)

= 0.18 X, and x = 0.72

P (rise) = 0.72 and P (fall) is 0.28

b. Expected future value = 0.72 x 11 + 0.28 x 0, = 7.92

Thus if investors are risk neutral, the value is Rs. 7.92.

c. PV of the option is therefore 7.92 x e^{-rt}

d. (i.e.) 7.92 x $e^{-0.12 \times 0.25}$ = Rs. 7.686

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PROBLEM 5 :

Mr. X established the following spread on the Delta Corporation's stock:

(i)   Purchased one 3-month call option with a premium of Rs.30 and an exercise price of Rs.550.

(ii)   Purchased one 3-month put option with a premium of Rs.5 and an exercise price of Rs.450.

Delta Corporation's stock is currently selling at Rs.500. Determine profit or loss, if price of Delta Corporation's:

(i)   Remains at Rs.500 after 3 months.

(ii)   Falls at Rs.350 after 3 months.

(iii) Rises to Rs.600.

Assume the size option is 100 shares of Delta Corporation

(Study Material + 2008 Exam - 6 Marks + April 2022 MTP – 6 Marks)

SOLUTION -5 :

(i)   Total premium paid on purchasing a call and put option

= (Rs.30 per share x 100) + (Rs.5 per share x 100).

= 3,000 + 500 = Rs.3,500

In this case, X exercise neither the call option nor the put option as both will result in a loss for him.

Ending Value   = -Rs.3,500 + Zero gain

= -Rs.3,500

i.e. Net loss   = Rs.3,500

(ii)   Since the price of the stock is below the exercise price of the call, the call will not be exercised. Only put is valuable and is exercised.

Total premium paid = Rs.3,500

Ending Value = -Rs.3,500 + Rs.[(450 – 350) x 100]

= -Rs.3,500 + Rs.10,000 = Rs.6,500

∴ Net gain   = Rs.6,500

(ii)   In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.

Total premium paid = Rs.3,500

Ending value = -3,500 + [(600 – 550) x 100]

Net Gain = -3,500 + 5,000 = Rs.1,500.

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PROBLEM 6 :

Mr. A purchased a 3 month call option for 100 shares in XYZ Ltd. at a premium of Rs.30 per share, with an exercise price of Rs.550. He also purchased a 3 month put option for 100 shares of the same company at a premium of Rs.5 per share with an exercise price of Rs.450. The market price of the share on the date of Mr. A's purchase of options, is Rs.500. Calculate the profit or loss that

Mr. A would make assuming that the market price falls to Rs.350 at the end of 3 months.

SOLUTION – 6 :

Since the market price at the end of 3 months falls to Rs.350 which is below the exercise price under the call option, the call option will not be exercised. Only put option becomes viable.

	Rs.
The gain will be:	
Gain per share (Rs.450 – Rs.350)	100
Total gain per 100 shares	10,000
Cost or premium paid (Rs.30 x 100) + (Rs.5 x 100)	3,500
Net gain	6,500

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PROBLEM 7 :

Distinguish between Cash and Derivative Market   *(RTP May, 2011)*

SOLUTION. 7 :

Following are main differences between Cash Market and Derivative Market.

(i) In cash market tangible assets are traded whereas in derivative market contracts based on tangible or intangibles assets like index or rates are traded.

(ii) In cash market, we can purchase even one share whereas in Futures and Options minimum lots are fixed.

(iii) Cash assets may be meant for consumption or investment. Derivative contracts are for hedging, arbitrage or speculation.

(iv) The value of derivative contract is always based on and linked to the underlying security. Though this linkage may not be on point-to-point basis.

(v) In the cash market, a customer must open securities trading account with a securities depository whereas to trade futures a customer must open a future trading account with a derivative broker.

(vi) Buying securities in cash market involves putting up all the money upfront whereas buying futures simply involves putting up the margin money.

(vii) With the purchase of shares of the company in cash market, the holder becomes part owner of the company. While in future it does not happen.

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PROBLEM 8 :

X Ltd.'s share is currently trading at Rs. 220. It is expected that in six months some if could double or halved (equivalent to a ó = 98%). One year call option on X Ltd.'s share has an exercise price of Rs. 165. Assuming risk free rate of interest to be 20%, calculate.

(a) Value of call option on X Ltd's Share.

(b) Option Delta for the second six month, in case stock price rises to Rs. 440 or falls to Rs. 110.

(c) Now suppose in 6 months the share price is Rs. 110. How at this point we can replicate portfolio of call options and risk-free lending.

SOLUTION. 8 :

The Possible prices of X Ltd.'s share and the associated call option values shown below:

(a) Let p is the probability of a rise in the stock price. Then, if investors are risk-neutral:

$P (1.00) + (1 – p)(-0.50) = 0.10$

$P = 0.4$

If the stock price in month 6 is Rs. 110, then the option will not be exercised. So expected value of call option is:

$[(0.4 \times Rs. \ 55) + (0.6 \times Rs. \ 0)]$

And its worth to be

$$\frac{[(0.4 \times Rs \ 55) + (0.6 \times Rs \ 0)]}{1.10} = Rs.20$$

Similarly, if the stock price is Rs. 440 in month 6, then, if it is exercised. The expected value of call option is

$[(0.4 \times Rs. \ 715) + (0.6 \times Rs. \ 55)]$

And it will be worth

$$\frac{[(0.4 \times Rs. \ 715) + (0.6 \times Rs. \ 55)]}{1.10} = Rs.290$$

Value of call today is:

$$\frac{[(0.4 \times Rs. \ 290) + (0.6 \times Rs. \ 20)]}{1.10} = Rs.116.36$$

(b)   (i) If the price rise to Rs. 440:

$$Delta = \frac{Rs.715 - Rs \ 55}{Rs. \ 880 - Rs. \ 220} = .1.0$$

(ii) If the price falls to Rs. 110:

$$Delta = \frac{Rs.55}{Rs. \ 220 - Rs. \ 55} = 0.33$$

(c)   If the stock price is Rs. 110 at 6 months the option delta is 0.33. therefore, in order to replicate the stock, we buy three calls and lend, as follows:

	Initial Outlay	Stock Price = 55	Stock Price = 220
Buy 3 calls	-60	0	165
Lend PV (55)	-50	+ 55	+ 55
	- 110	+ 55	+ 220
This Strategy is equivalent to:			
Buy stock	-110	+ 55	+ 220

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PROBLEM 9 :

Market Prices of S Ltd are expected to have the following probability distributions with respect to market price per share 6 months hence.

Probability of Occurrence	Expected Market Price 6 months hence (per share)
0.05	*170*
0.20	*190*
0.40	*200*
0.20	*220*
0.15	*240*

Options are available for an exercise rate of Rs. 200 and expiration 6 months from now.

(i)   What is the expected value of market price per share.

(ii)   What is the expected value of call option price for S Ltd. For same duration.

SOLUTION. 9 :

(i) Calculation of Expected Value of Market Price per share

Probability of Occurrence	Expected Market Price 6 Months hence (per share)	Expected Value of Market Price Per Share
0.05	170	8.5
0.20	190	38
0.40	200	80

0.20	220	44
0.15	240	36
Total		**206.50**

(ii) Calculation of Expected Value of Call Option

Probability of Occurrence	Value of Option	Expected Value of call Option(Rs.)
0.05	0	0
0.20	0	0
0.40	0	0
0.20	20	4
0.15	40	6
Total		**10**

*****

PROBLEM 10 :

Dravid Investment Ltd deals in equity derivatives. Their current portfolio companies of the following instruments:

Infosys Rs. 5600 Call Expiry June 2004, 2,000 Units bought at Rs. 197 each (cost)

Infosys Rs. 5700 Call Expiry June 2004, 3,600 Units bought at Rs. 131 each (cost)

Infosys Rs. 5400 put Expiry June 2004, 4,000 Units bought at Rs. 81 each (cost)

What will the profit or loss to Dravid Investment Ltd in the following situations?

(i)   Infosys closes on the expiry day at Rs. 6,041

(ii)   Infosys closes on the expiry day at Rs. 5,812

(iii)   Infosys closes on the expiry day at Rs. 5,085

SOLUTION. 10 :

Instrument	Units	Cost	Strike Price	Pay off/ unit at infosys Closing Price		
				(i) At 6,041	(ii) 5,812	(iii) At 5,085
5,600 Call	2,000	197	5,600	441	212	Nil
5,700 Call	3,600	131	5,700	341	112	Nil
5,400 Put	4,000	81	5,400	Nil	Nil	315

It may also be possible that in question paper areas under Z may be mentioned otherwise e.g. Cumulative Area or Area under two tails. In such situation the areas of the respective Zs given in the question will be as follows:

*****

PROBLEM 11 :

The stock of Spears Entertainment currently sells for Rs. 28. A call option on this stock has a strike price of Rs. 25 and it sells for Rs. 5.25. A put option on this stock has a strike price of Rs. 30, and it sells for Rs. 3.10. What is the intrinsic value of each option? What is the time value of each option?

SOLUTION. 11 :

Value or Price of an option   = Intrinsic Value + Time Value

Intrinsic value of call   = Max (S -X, 0)

Intrinsic value of put   = Max (X - S, 0)

Using the above definitions we can find:

For Call, Intrinsic Value = Rs. 3, Time Value = Rs. 2.25

For Put, Intrinsic Value = Rs 2, Time Value = Rs. 1.10

PROBLEM 12 :

Mr. Narendra holds an American put option on Delta Airlines a non dividend paying stock. The strike price of the put is Rs. 40, and Delta Airlines stock is currently selling for Rs. 35 per share. The current market price of the put is Rs. 4.50. Is this option correctly priced? If not, should Mr. Narendra buy or sell the option in order to take advantage of the mis-pricing?

SOLUTION. 12 :

The put is not correctly priced. An American put option must always be worth more than the value of immediate exercise. The value of immediate exercise for a put option equals the strike price minus the current stock price. In this problem, the value of immediate exercise is Rs. 5 (= Rs. 40 – Rs.35). Since the option is currently selling for Rs. 4.50, less than the value of immediate exercise, the option is under-priced. Consider the following investment strategy designed to take advantage of the mis-pricing:

Strategy	Cash Flow
Buy put option	- Rs 4.50
Buy stock	- Rs. 35.00
Exercise put option	+ Rs. 40.00
Arbitrage Profit	+ Rs. 0.50

Therefore, Mr. Narendra should buy the option for Rs. 4.50, buy the stock for Rs. 35, and immediately exercise the put option to receive its strike price of Rs. 40. This strategy yields a risk less, arbitrage profit of Rs. 0.50 (= Rs. 5 – Rs. 4.50).

*****

PROBLEM 13 :

We are provided with the following information:

Stock price = Rs. 33; Strike price = Rs. 35; Time = 6 months; Risk-free rate = 5%; Price of Call option with (X = 35) = Rs. 4.50. Find the theoretical value of put option. If the same put option is available in the market at Rs. 5, how the situation is dealt by the arbitrageur?

SOLUTION. 13 :

Put call parity states that:

S + P = C + PV(X)

i.e. Put price = the present value exercise price - stock price + call price

P = (PV of Rs. 35, discounted for 6 months at 5%) - 33 + 4.50 = 34.15 - 33 + 4.50 = Rs. 5.65

If the put option sells for Rs. 5 instead of Rs. 5.65, it is under-priced. The arbitrageur would buy the put option for Rs. 5. As we know that arbitrage involves a buy and a sell. Now we need to decide the sell position. The arbitrageur would sell a synthetic put option. From put-call parity, we can identify this portfolio equivalent to a synthetic short put option.

S + P = PV(X) + C

S - PV(X) - C = -P

To create the synthetic short put, sell the call option for Rs. 4.50, borrow' Rs. 34.15, and buy the stock. This will net Rs. 5.65 as can be seen below. (+ signs for cash inflows, and -e signs for cash outflows)

+Rs. 4.50 Sell call

+Rs. 34.15 Proceeds from borrowing

–Rs. 33.00 Buy stock

The overall profit = +Rs. 5.65-Rs. 5.00 = Rs. 0.65, i.e. it yields a profit of Rs. 0.65, without risk to the arbitrageur.

*****

PROBLEM 14 :

*The **current market price of the equity shares of Bharat Bank Ltd. is Rs. T90 per share. It may be either Rs.250 or Rs. 140 after a year. A call option with a strike price of Rs.180 (time 1 year) is available. The rate of interest applicable to the investor is 9%. Rahul wants to create a replicating***

portfolio in order to maintain his pay off on the call option for 100 shares. Find out (i) hedge ratio; (ii) amount of borrowing; (iii) fair value of the call; and (iv) his cash flow position after a year.

SOLUTION. 14 :

We need to create a replicating portfolio same as that of the option which we want to find value i.e. call option. Before creating a replicating portfolio, let us see what will be the payoff of the given call option at the two prices given. We have X =180, and at expiration, the call will be worth Rs. 70 (Rs. 250 - Rs. 180) if the stock price goes up, or zero if the stock price goes down to Rs. 140 (since we would then be indifferent to exercising it).

Our aim now is create a replicating portfolio of stock (the asset) and borrow/lend in such a way that we get the same cash flows as that of the option under consideration. Suppose we let A stand for the number of shares we would need to buy and B for the number of rupees we would need to borrow. Then our problem is to find values of Δ and B such that the following two equations get satisfied simultaneously.

At expiry if the stock price goes to Rs. 250, we have:

$(250 \times \Delta) - B. (1+0.09) = 70$

At expiry if the stock price goes to Rs. 50, we have:

$(140 \times \Delta) - B. (1+ 0.09) = 0$

The first equation insures that our stock-cash portfolio has the same return as the option if the stock goes up and the second assures us the returns will also be equal if the stock goes down.

Solving the two equations simultaneously, we get B and Δ as, B = Rs. 81.73 and Δ = 0.636 Therefore hedge Ratio = 0.636 and the borrowed money for a share = Rs. 81.73 or Rs. 8173 for 100 shares.

This would ensure that the portfolio of stock-cash position will deliver same returns as a call. The value of the call will then be:

Fair Value of call = ΔS - B = 0.636* x 190 - 81.73 = Rs. 39.11

Call Option Price = Rs. 39.11

Verification:

We now verify that cash flow position after the period is same as that of call option for 1 share

For 1 Share	Cash Flow - Now	Cash Flow at Expiry	
		S = Rs. 250	S = Rs. 140
A. Call Option	**- Rs. 39.11**	**+ Rs. =70**	**Rs. 0**
B. Replicating Portfolio			
Buy AS i.e. 0.636 shares	- **Rs.** 120.84	+ **Rs.** 159	+ **Rs.** 89
Borrow **Rs.** 81.73	+ **Rs.** 81.73	- **Rs.** 89*	- **Rs.** 89*
Net	**- Rs. 39.11**	**+ Rs.** *70*	**Rs. 0**

* - Rs. 81.73 x (1.09) - Repayment of borrowed money at 9%

We can see that cash flow from replicating portfolio exactly matches with the cash flows of call option. We now verify that cash flow position after the period is same as that of call option for 100 shares

For 100 Share	Cash Flow - Now	Cash Flow at Expiry	
		S = Rs. 250	S = Rs. 140
A. Call Option	**- Rs. 3911**	**+ Rs. 7000**	**Rs. 0**
B. Replicating Portfolio			
Buy AS i.e. 0.636 shares	- **Rs.** 12,084	+ **Rs.** 15,900	+ **Rs.** 8900
Borrow **Rs.** 81.73	+ **Rs.** 8173	- **Rs.** 8900*	- **Rs.** 8900*
Net	**- Rs. 3911**	**+ Rs. 7000**	**Rs. 0**

* - Rs. 8173 x (1.09) - Repayment of borrowed money at 9%

*****

PROBLEM 15 :

Sumana wanted to buy shares of EIL which has a mage of Rs. 411 to Rs. 592 a month laer. The

present price per share is Rs. 421. Her broker informs her that the price of this share can sore up to Rs.522 within a month or so, so that she should buy a one month CALL of EIL. In order to be prudent in buying the call, the share price should be more than or at least Rs. 522 the assurance of which could not be given by her broker.

Though she understand that uncertainty of the market, she wants to know the probability of attaining the share price Rs. 592 so that buyng of a one month CALL of EIL at the execution price Rs. 522 is justified. Advice her. Take the risk free interest to be 3.60% and $e^{0.036} = 1.037$.

SOLUTION. 15 :

We can use the 'risk neutral principle' in the binomial model to advise Sumana to know the probability of attaining the share price of Rs. 592.

In this problem,

Current Market Price = S = ₹421

Strike Price = X = 522

Given rate of interest 'r' as 3.6% per month (since exponential value is given for 0.036)

S_u = Maximum Price = 592

S_d = Minimum Price = 411

As per "Risk Neutral Model' the expected value of S after one month by investing in stock S today should match the amount available by depositing the same amount at 'risk free interest'. Let us assume 'p' be the probability of stock S going up to S_u and let '1-p' be the probability of stock S going down to S_d. Thus we get after one month, p x 592+ (1-p)x 411 =421 xe^{0036}

Solving we get, p = Stock going up to 592 is = 0.1413 = 14.13%

*****

PROBLEM 16 :

On September 1, 2008 the stock of AMREX LTD. (AL) was trading at Rs.120 and call option exercisable in three months times had an exercise rate of Rs.112. The standard deviation of the continuously compounded stock price change for Amrex Ltd. is estimated to be 30% per year. The annualized Treasury Bill rate corresponding to this option life is 7%.

Required:

I. *Compute the value of a three (3) months call option on the stock of Amrex Ltd. using*

 Black-scholes model.

II. *What would be the value of put option for the same?*

Note:

Extracted from the tables:

1)   *Natural Logarithms: Ln (1.071429) = 0.068993,*

  Ln(0.93333) = - 0.06900

2)   *Value of e^{-x} e$^{-0.02}$ = 0.9802 and $e^{-0.01}$ = 0.9900*

3)   *Cumulative standardized normal probability distribution: NCX*

  When X ≥ 0: N(0.6516) = 0.7427, N(0.5016) = 0.6921

  When X ≤ 0: N(-0.6516) = 0.2573, N(-0.5016) = 0.3079

4)   *The stock of APTECH LTD. (FV Rs. 10) quotes Rs. 920 to day on NSE and the 3 month futures price quotes at Rs. 950. The one month borrowing rate is given as 8% and the expected annual dividend yield is 15% p.a. payable before expiry.*

Your are required to calculate the price of 3 month APTECH FUTURES.

SOLUTION. 16 :

AMREX Ltd
Valuation of Call Option: So x Nd$_1$ - (Exe^{-n} x Nd$_2$)

Term	Calculation	Result
1. So = Current price of stock	Given	120
2. E = Exchange price	Given	112
3. PV of E = Present value of Exercise price	E x e^{-rt} = 112 x e$^{-007 \times 0.25}$	109.78
4. $Ln\left(\dfrac{So}{E}\right)$	$Ln\left(\dfrac{120}{112}\right) = Ln(1.071429)$	0.068993
5. $d_1 = \dfrac{[Ln\left(\dfrac{So}{E}\right) + (r + 0.5\sigma^2)xt]}{\sigma\sqrt{t}}$	$\dfrac{[0.068993 + (0.07 + 0.5 \times 0.09) \times 0.25]}{[0.30 \times \sqrt{0.25}]} = \dfrac{0.068993 + 0.02875}{0.15}$	0.6516
6. $d_2 = d_1 - \sigma\sqrt{t}$	0.6516 − 0.15	0.5016

Value of call option (C$_p$)

$(S_0 \times Nd_1) - (Exe^{-rt} \times Nd_2)$ = (120 x 0.7427) - (109.78 x 0.6921)

                                      = 89.124-75.9787

                                      = 13.1453 i.e. Rs 13.14.

Value of put option:

Based on put-call parity theorem:

              C_p + PV of E - S_0 = 13.14 + 109.78 - 120 = Rs. 2.92

(c) Futures price is governed by the following equation:

Future price = Spot price + cost of carry - Income

Cost of carry is the cost of spot price for the period of contract.

The question says one month borrowing rate is 8%. It is unrealistic, hence it is taken as one year borrowing rate.

The spot price is given as Rs. 920. The cost of carry will be interest on Rs. 920 for a period of 3 months (period of contract) at 8% per annum. Hence the cost of carry would be

Cost of carry = $\left(8\% \times \dfrac{3}{12}\right)$ = Rs.18.40

Income is dividend @15%. You should note that dividend is paid on the face value and not on spot price. / Dividend would be 15% of face value of Rs 10. Thus dividend would be Rs 1.50. The future price would be j Future price = 920 + 18.40 - 1.50 = Rs 936.90

*****

PROBLEM 17 :

The stock of MOULIN LTD is currendy trading at Rs 500 and call option exercisable in three months time and has an exercise rate of Rs 488. The standard deviation of continuously compounded stock price change for MOULIN LTD is estimated to be 20% per year. The annualized Treasury bill rate corresponding to this option life is 6% p.a. The company is going to declare a dividend of Rs 15 and it is expected to be paid in two months time.

Requirements:

I. *Determine the value of a three-month call option on the stock of MOULIN LTD (using Black Scholes model)*

II. *What would be the value of Put Option if the current price of stock is considered to be Rs. 485.15?*

Note : Extracted from tables:

(1) Natural Logarithm: In (0.99416) = -0.005857

In (1.02459) = 0.024929

(2) Value of e^{-x}: $e^{-0.02}$ = 0.9802, $e^{-0.015}$ = 0.9851

(3) For N (x): where $X \geq 0$: N(0.1414) = 0.5562

N(0.01414) = 0.5165

Where $X \leq 0$: N(-0.1414) = 0.4438

N(-0.01414) = 0.4835

(4) PVIF (6%, 0.25 years) = 0.9852, PVIF (6%, 1/6 years) = 0.9901

SOLUTION. 17 :

(i) Since dividend is expected to be paid in two months time, we have to adjust the stock price and then use Black and Scholes model to value the option.

PV. of the expected dividend: 15 x 0.9901 = Rs. 14.85

Dividend adjusted stock price: Rs. 500 – Rs. 14.85 = Rs. 485.15

Valuation of CALL OPTION: (using Black & Scholes Mode)

$$V_0 = V_s. N(d_1) - Ee^{-rt}N(d_2)$$

Where, V_s = Current price of stock (adjusted) = Rs.485.15

E = exercise price = Rs. 488, r = Risk free rate = 0.06

$$d_1 = \frac{\ln(V_s/E) + [r + i/2\sigma^2] \times t}{\sigma\sqrt{t}}$$

$$= \frac{\ln(488.15/488) + [0.06 + \frac{1}{2}(0.20)^2] \times 0.25}{0.20\sqrt{0.25}}$$

$$= \frac{\ln(0.99416) + 0.02}{0.10} = \frac{(-0.005857 + 0.20)}{0.10}$$

$$= 0.1414$$

d_2 = 0.1414-0.10 = 0.0414

N(d_1) = N(0.1414) = 0.5562

N(d_2) = N(0.0414) = 0.5165

Value of Call option (V_o) = V_s. N(d_1) - Ee^{-rt} N(d_2)

Where $^{-rt}$ = e$^{-0.06 + 025}$ = e$^{-0.015}$ = 0.9851

Therefore, Vo = (485.15 x 0.5562) - (488 x 0.9851 x 0.5165)

= 269.84 - 248.30 = Rs. 21.54

(ii) Value of Put Option: Xe^{-rt} [1 - N(d_2)] - S[1 - N(d_1)]

= 488 x 0.9851 [1 - 0.5165] - 485.15[1 - 0.5562]

= 232.43 - 215.31 = Rs. 17.12

*****

PROBLEM 18 :

Mr. Dayal is interested in purchasing equity shares of ABC Ltd. which are currently selling at Rs. 600 each. He expects that price of share may go upto Rs. 780 or may go down to Rs. 480 in three months. The chances of occurring such variations are 60% and 40% respectively. A call option on the shares of ABC Ltd. can be exercised at the end of three months with a strike price of Rs. 630.

(i) What combination of share and option should Mr. Dayal select if he wants a perfect hedge?

(ii) What should be the value of option today (the risk free rate is 10% p.a.)?

(iii) What is the expected rate of return on the option?

SOLUTION. 18 :

(i) To compute perfect hedge we shall compute Hedge Ratio (Δ) as follows:

$$\frac{C_1 - C_2}{S_1 - S_2} = \frac{150 - 0}{780 - 480} = \frac{150}{300} = 0.50$$

Mr. Dayal should purchase 0.50 share for every 1 call option.

(ii) Value of Option today

If price of share comes out to be Rs.780 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x Rs. 780)	Rs. 390
Loss on account of Short Position (Rs. 780 – Rs. 630)	Rs. 150
	Rs. 240

If price of share comes out to be Rs. 480 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x Rs. 480)	Rs. 240

Accordingly, Premium say P shall be computed as follows:

(Rs. 300 – P) 1.025 = Rs. 240 P = Rs.65.85

(iii) Expected Return on the Option

Expected Option Value = (Rs. 780 – Rs. 630) × 0.60 + Rs. 0 × 0.40 = Rs. 90

Expected Rate of Return = $\dfrac{90 - 65.85}{65.85} \times 100 = 36.67\%$

*****

PROBLEM 19 :

You as an investor had purchased a 4 month call option on the equity shares of X Ltd. of Rs. 10, of which the current market price is Rs. 132 and the exercise price Rs. 150. You expect the price to range between Rs.120 to Rs.190. The expected share price of X Ltd. and related probability is given below:

Expected Price (Rs.) 120   140   160   180   190

Probability   .05   .20   .50   .10   .15

Compute the following:

(1) Expected Share price at the end of 4 months.

(2) Value of Call Option at the end of 4 months, if the exercise price prevails.

(3) In case the option is held to its maturity, what will be the expected value of the call option?

(May 2022 Exam – 4 Marks)

SOLUTION. 19 :

(1) Expected Share Price

= Rs.120X 0.05 + Rs.140X 0.20 + Rs.160X 0.50 + Rs.180X 0.10 + Rs.190X 0.15

= Rs.6 + Rs.28 + Rs.80 + Rs.18 + Rs.28.50 = Rs.160.50

(2) Value of Call Option

= Rs.150 - Rs.150 = Nil

(3) If the option is held till maturity the expected Value of Call Option

Expected price (X)	Value of call (C)	Probability (P)	CP
Rs. 120	0	0.05	0
Rs. 140	0	0.20	0
Rs. 160	Rs. 10	0.50	Rs. 5
Rs. 180	Rs. 30	0.10	Rs. 3
Rs. 190	Rs. 40	0.15	Rs. 6

			Rs. 14
Total			

Alternatively, it can also be calculated as follows:

Expected Value of Option

(120 – 150) X 0.1 Not Exercised*

(140 – 150) X 0.2 Not Exercised*

(160 – 150) X 0.5 5

(180 – 150) X 0.1 3

(190 – 150) X 0.15   6

    14

* If the strike price goes below Rs. 150, option is not exercised at all.

*****

PROBLEM 20 :

The equity share of VCC Ltd. is quoted at Rs. 210. A 3-month call option is available at a premium of Rs. 6 per share and a 3-month put option is available at a premium of Rs. 5 per share. Ascertain the net payoffs to the optionholder of a call option and a put option.

(i) the strike price in both cases in Rs. 220; and

(ii) the share price on the exercise day is Rs. 200,210,220,230,240.

Also indicate the price range at which the call and the put options may be gainfully exercised.

(Study Mayerial)(Oct. 2019 – MTP – 7 Marks)

SOLUTION. 20 :

Net payoff for the holder of the call option

					`
Share price on exercise day	200	210	220	230	240
Option exercise	No	No	No	Yes	Yes
Outflow (Strike price)	Nil	Nil	Nil	220	220
Out flow (premium	6	6	6	6	6
Total Outflow	6	6	6	226	226
Less inflow (Sales proceeds)	-	-	-	230	240
Net payoff	-6	-6	-6	4	14

Net payoff for the holder of the put option

					`
Share price on exercise day	200	210	220	230	240
Option exercise	Yes	Yes	No	No	No
Outflow (Strike price)	220	220	Nil	Nil	Nil
Less Out flow (purchase price)	200	210	-	-	-
Less Out flow (premium)	5	5	5	5	5
Net payoff	15	5	-5	-5	-5

The loss of the option holder is restricted to the amount of premium paid. The profit (positive payoff) depends on the difference between the strike price and the share price on the exercise day.

*****

PROBLEM 21 :

Ram holding shares of Reliance Industries Ltd. which is currently selling at ` 1000. He is expecting that this price will further fall due to lower than expected level of profits to be announced after one month. As on following option contract are available in Reliance Share.

Strike Price (`)	Option	Premium (`)
1030	Call	40
1010	Call	35
1000	Call	30

990	Put	35
970	Put	20
950	Put	8
930	Put	5

Ram is interested in selling his stock holding as he cannot afford to lose more than 5% of its value.

RECOMMEND a hedging strategy with option and show how his position will be protected.

(Nov. 2018 – RTP + Nov. 2021 – MTP – 6 Marks + April 2023 MTP – 6 Marks)

SOLUTION : 21

Instead of selling the stock of Reliance Ltd., Ram must cover his Risk by buying or long position in Put Option with appropriate strike price. Since Ram's risk appetite is 5%, the most suitable strike price in Put Option shall be ` 950 (` 1000 - 5% of ` 1000). If Ram does so, the overall position will be as follows:

Spot Price after 1 month	Stock Value	Put Payoff	Initial Cash Flow	Total
S < 950	S	950 - S	-8	942 - S
S > 950	S	-	-8	S - 8

Thus, from the above, it can be seen that the value of holding of Ram shall never be less than ` 942 as Put Option will compensate for loss below spot price of ` 950. However, this strategy will involve a cost of ` 8.

*****

QUESTION 22 :

A call option on gold with exercise price Rs 26,000 per ten gram and three months to expire is being traded at a premium of Rs 1,010 per ten gram. It is expected that in three months time the spot price might change to Rs 27,300 or 24,700 per ten gram. At present this option is at-the-money and the rate of interest with simple compounding is 12% per annum. Is the current premium for the option justified? Evaluate the option and comments. **(Nov. 2017–RTP)**

SOLUTION : 22

To determine whether premium is justified we shall compute the value of option by using any of the following models:

By use of Binomial Model

Decision Tree showing Pay off

Year 0		3 months	pay off
26000	- - - - - - - →	27300	1300
	- - - - - - - →	24700	0

The Delta (Δ) Ratio

$$\Delta = \frac{1300 - 0}{27300 - 24700} = 0.50$$

Replicating portfolio Buy 5 gram of gold and sell one call option.

The pay off if price goes up = 0.50 x Rs 27300 - Rs 1,300 = Rs 12,350

The pay off if price goes down = 0.50 x Rs 24,700 = Rs 12,350

Present Value of Pay-off = $\frac{Rs\ 12,350}{1.03} = Rs\ 11,990$

Current Investment = Rs 26,000 x 0.50 = Rs 13,000

Value of Option = Rs 13,000 - Rs 11,990 = Rs 1,010

Thus the price of option is justified.

Alternatively, by using Risk Neutral Model:

First of all we shall calculate probability of high demand (P) using risk neutral method as follows:

3% = p x 5% + (1-p) x (-5%)

0.03 = 0.05 p - 0.05 + 0.05p

$$p = \frac{0.08}{0.10} = 0.80$$

The value of Call Option $= \dfrac{= 1300 \times 0.8 + 0 \times 0.2}{1.03} = $ Rs 1,009.71 say Rs 1,010

Thus, the price of option is justified.

*****

QUESTION 23 :

The equity share of SSC Ltd. is quoted at Rs 310. A three month call option is available at a premium of Rs 8 per share and a three month put option is available at a premium of Rs 7 per share.

Ascertain the net payoffs to the option holder of a call option and a put option, considering that:

(i)   the strike price in both cases is Rs 320; and

(ii) the share price on the exercise day is Rs 300, 310, 320, 330 and 340.

Also indicate the price range at which the call and the put options may be gainfully exercised.

(Nov. 2018 Sugg)

SOLUTION :23

Net payoff for the holder of the call option

					(Rs)
Share price on exercise day	300	310	320	330	340
Option exercise	No	No	No	Yes	Yes
Outflow (Strike price)	Nil	Nil	Nil	320	320
Out flow (premium)	8	8	8	8	8
Total Outflow	8	8	8	328	328
Less inflow (Sales proceeds)	-	-	-	330	340
Net payoff	-8	-8	-8	2	12

Net payoff for the holder of the put option

Share price on exercise day	300	310	320	330	340
Option exercise	Yes	Yes	No	No	No
Inflow (strike price)	320	320	Nil	Nil	Nil
Less outflow (purchase price)	300	310	-	-	-
Less outflow (premium)	7	7	7	7	7
Net Payoff	13	3	-7	-7	-7

The Call Option can be exercised gainfully for any price above Rs 328 and Put Option for any Price below Rs 313.

*****

QUESTION 24 :

Mr. John established the following spread on the TTK Ltd.`s stock:

1)   Purchased one 3-month put option with a premium of Rs 15 and an exercise price of Rs 900.

2)   Purchased one 3-month call option with a premium of Rs 90 and an exercise price of Rs 1100.

TTK Ltd.'s stock is currently selling) at Rs 1000. Calculate gain or loss, if the price of stock of TTK Ltd. -

(i)   Remains at Rs 1000 after 3 months.

(ii) Falls to Rs 700 after 3 months.

(iii) Raises to Rs 1200 after 3 months.

Assume the size of option is 200 shares of TTK Ltd.   **(May 2019 Sugg)**

SOLUTION : 24

(i)   Total premium paid on purchasing a call and put option

       = (Rs 15 per share x 200) + (Rs 90 per share x 200).

       = Rs 3,000 + Rs 18,000 = Rs 21000

       In this case, Mr. John exercises neither the call option nor the put option as both will result in a loss for him.

       Ending value = - Rs 21000 + zero gain = - Rs 21000

       i.e. Net loss = Rs 21000

(ii)   Since the price of the stock is below the exercise price of the call, the call will not be exercised. Only put is valuable and is exercised.

       Net Gain = (Exercise Price - Current Price) x No of Shares - Premium Paid

       Total premium paid = Rs 21000

       Ending value = - Rs 21000 + Rs [(900 - 700) x 200] = Rs 19,000

       ∴ Net gain = Rs 19,000

(iii) In this situation, the put is worthless, since the price of the stock exceeds the put's exercise price. Only call option is valuable and is exercised.

       Total premium paid   = Rs 21000

       Ending value   = - Rs 21000 + Rs [(1200 - 1100) x 200] = - Rs 1000

       Net Loss   = Rs 1,000

*****

QUESTION 25 :

As an investor you had purchased a 4 month call option on the equity shares of Z Ltd. of Rs 10, of which the current market price is Rs 132 and the exercise price Rs 150. You expect the price to range between Rs 120 to Rs 190. The expected share price of Z Ltd. and related probability is given below:

Expected Price (Rs)	120	140	160	180	190
Probability	.05	.20	.50	.10	.15

Compute the following:

(i)   Expected share price at the end of 4 months.

(ii)   Value of Call Option at the end of 4 months, if the exercise price prevails.

(iii) In case the option is held to its maturity, what will be the expected value of the call option?
                          (May 2022 Exam – 4 Marks)(Nov. 2018 Exam)(Study Material)

SOLUTION : 25

(1) Expected Share Price

       = `120X 0.05 + `140X 0.20 + `160X 0.50 + `180X 0.10 + `190X 0.15

       = `6 + `28 + `80 + `18 + `28.50 = `160.50

(2) Value of Call Option

       = `150 - `150

       = Nil

(3) If the option is held till maturity the expected Value of Call Option

Expected price (X)	Value of call (C)	Probability (P)	CP
` 120	0	0.05	0
` 140	0	0.20	0
` 160	` 10	0.50	` 5

| `180 | `30 | 0.10 | `3 |
| `190 | `40 | 0.15 | `6 |
| Total | | | `14 |

Alternatively, it can also be calculated as follows:

Expected Value of Option

(120 - 150) X 0.05	Not Exercised*
(140 - 150) X 0.20	Not Exercised*
(160 - 150) X 0.50	5
(180 - 150) X 0.10	3
(190 - 150) X 0.15	6
	14

* If the strike price goes below ` 150, option is not exercised at all.

*****

QUESTION 26 :

A two year tree for a share of stock in ABC Ltd., is as follows .

Now   1 year later   2 years later
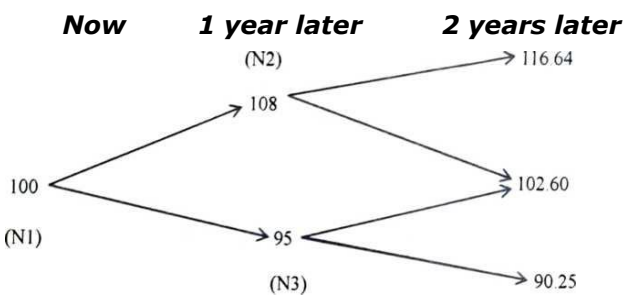
Consider a two years American call option on the stock of ABC Ltd., with a strike price of ` 98. The current price of the stock is ` 100. Risk free return is 5 per cent per annum with a continuous compounding and $e^{0.05} = 1.05127$.

Assume two time periods of one year each.

Using the Binomial Model, calculate:

(i) The probability of price moving up and down

(ii) Expected pay offs at each nodes i.e. Nl, N2 and N3 (round off upto 2 decimal points).

(Nov. 2020 Exam - 8 Marks + May 2023 RTP)

SOLUTION : 26

(i) Calculation of Probabilities

Let 'x' be the probability of Higher S1 (i.e., Rs. 108).

Then, (1-x) will be the probability of Lower S1 (i.e., Rs. 95)

Then,

$$\left[\frac{\text{Higher } S_1 - S_0}{S_0}\right] x + \left[\frac{\text{Lower } S_1 - S_0}{S_0}\right](1-x) = e^{rt} - 1$$

So,

$$\left[\frac{\text{Rs. } 108 - \text{Rs. } 100}{\text{Rs. } 100}\right] x + \left[\frac{\text{Rs. } 95 - \text{Rs. } 100}{\text{Rs. } 100}\right](1-x) = 1.05127 - 1$$

That is,

0.08x + (-0.05) (1-x) = 0.05127

0.08x - 0.05 + 0.05x = 0.05127

0.13x = 0.05127 + 0.05 = 0.10127

So, $x \dfrac{0.10127}{0.13} = 0.779$

$(1-x) = 1 - 0.779 = 0.221$

Therefore,

Probability of Upward movement is 0.779

Probability of Downward movement is 0.221

(ii) Expected Pay-off at each Node (under Binomial Model)

$r = 5\%$

$t = 1$ Year

So, $e^{rt} = e^{0.05} = 1.05127$

Case (i): Node N2 [Between Year 1 and Year 2 (When So is Rs. 108)]

S_o = Rs. 108

S_1 = Rs. 102.60 and 116.64

E = Rs. 98

S_1	C_1 [Max(S-E,0)]
102.60	4.60
116.64	18.64

Buy Δ Stock and Sell 1 Call Option

$$\Delta = \frac{\text{Spread in } C_1}{\text{Spread in } S_1} = \frac{\text{Rs } 18.64 - \text{Rs } 4.60}{\text{Rs } 116.64 - \text{Rs } 102.60} = \frac{\text{Rs } 14.04}{\text{Rs } 14.04} = 1$$

So, Buy 1 Units of Stock and Sell 1 Call Option.

Symbolically, $\Delta S_0 - C_0 = \mathbf{1S_o - C_o}$

Calculate the 'value of Portfolio' on the Expiry date of Option   Rs.

Value of the Underlying on Expiry Date (S_1)	Value of Stock on the date of Option Expiry (No. of Units X S_1)	Value of Call Option Sold on Expiry [Min(E-S,0)]	Total Value of the Portfolio
102.60	1 X 102.60 = 102.60	-4.60	**98.00**
116.64	1 X 116.64 = 116.64	-18.64	**98.00**

Value of 'hedged portfolio' on expiry: Rs. 98.00

$$\text{Present value of the portfolio} = \frac{\text{Value of Portofolio on expiry date}}{e^{rt}} = \frac{\text{Rs } 98}{1.05127} = \text{Rs } 93.22$$

That is,

$1S_0 - Co = $ Rs. 93.22

$(1 \times$ Rs. 108$) - Co = $ Rs. 93.22

Rs. 108 - Co = Rs. 93.22

So, Co = Rs. 108 - Rs. 93.22 = **Rs. 14.78**

Case (ii): Node N3 [Between Year 1 and Year 2 (When So is Rs. 95)]

So = Rs. 95

S_1 = Rs. 90.25 and Rs. 102.60

E = Rs. 98

S_1	C_1 [Max(S-E,0)]
90.25	0
102.60	4.60

Buy Δ Stock and Sell 1 Call Option

$$\Delta = \frac{\text{Spread in C}_1}{\text{Spread in S}_1} = \frac{\text{Rs 4.60 - Rs 0}}{\text{Rs 102.60 - Rs 90.25}} = \frac{\text{Rs 4.60}}{\text{Rs 12.35}} = 0.3725$$

So, Buy 0.3725 Units of Stock and Sell 1 Call Option.

Symbolically, ΔSo - Co = **0.3725So - Co**

Calculate the 'value of Portfolio' on the Expiry date of Option   **Rs.**

Value of the Underlying on Expiry Date (S1)	Value of Stock on the date of Option Expiry (No. of Units X S1)	Value of Call Option Sold on Expiry [Min(E-S,0)]	Total Value of the Portfolio
90.25	0.3725 X 90.25 = 33.62	0	**33.62**
102.60	0.3725 X 102.60 = 38.22	-4.60	**33.62**

Value of 'hedged portfolio' on expiry: Rs. 33.62

$$\text{Present value of the portfolio} = \frac{\text{Value of Portofolio on expiry date}}{e^{rt}} = \frac{\text{Rs 33.62}}{1.05127} = \text{Rs 31.98}$$

That is,

$0.3725S_0$ - Co = Rs. 31.98

(0.3725 X Rs. 95) - Co = Rs. 31.98

Rs. 35.39 - Co = Rs. 31.98

So, Co = Rs. 35.39 - Rs. 31.98 = Rs. 3.41

Case (iii): Node N1 [Between Now and Year 1 (When S0 is 100)1

So = Rs. 100

S1 = Rs. 95 and Rs. 108

E = Rs. 98

S_1	C_1 [Max(S-E,0)]
95	3.41
108	14.78

Buy Δ Stock and Sell 1 Call Option

$$\Delta = \frac{\text{Spread in C}_1}{\text{Spread in S}_1} = \frac{\text{Rs 14.78 - Rs 3.41}}{\text{Rs 108 - Rs 95}} = \frac{\text{Rs 11.37}}{\text{Rs 13.00}} = 0.8746$$

So, Buy 0.8746 Units of Stock and Sell 1 Call Option.

Symbolically, Δ So - Co **= 0.8746So - Co**

Calculate the 'value of Portfolio' on the Expiry date of Option   **Rs.**

Value of the Underlying on Expiry Date (S_1)	Value of Stock on the date of Option Expiry (No. of Units X S_1)	Value of Call Option Sold on Expiry [Min(E-S,0)]	Total Value of the Portfolio
95	0.8746 X 95 = 83.09	- 3. 41	**79.68**
108	0.8746 X 108 = 94.46	-14.78	**79.68**

Value of 'hedged portfolio' on expiry: Rs. 79.68

$$\text{Present value of the portfolio} = \frac{\text{Value of Portofolio on expiry date}}{e^{rt}} = \frac{\text{Rs 79.68}}{1.05127} = \text{Rs 75.79}$$

That is,

$8746S_0$ - Co = Rs. 75.79

(0.8746 X Rs. 100) - Co = Rs. 75.79

Rs. 87.46 - Co = Rs. 75.79

So, Co = Rs. 87.46 - Rs. 75.79 = Rs. 11.67

Alternative Approach (Under Risk Neutral Model)

Node N$_2$

VALUE ON EXPIRY [Max(S-E,0)]	PROB	PRODUCT
4.60	0.221	1.02
18.64	0.779	14.52
Expected Value on Maturity		15.54

Value of C_0   **14.78**

[Expected value on Maturity / 1.05127]

Node N_3

VALUE ON EXPIRY	PROB	PRODUCT
0.00	0.221	0.00
4.60	0.779	3.58
Expected Value on Maturity		3.58

Value of C_0   **3.41**

[Expected value on Maturity /1.05127]

Node N_1

VALUE ON EXPIRY	PROB	PRODUCT
3.41	0.221	0.75
14.78	0.779	11.51
Expected Value on Maturity		12.27

Value of C_0   **11.67**

[Expected value on Maturity /1.05127]

*****

QUESTION 27 :

The market received rumour about ABC corporation's tie-up with a multinational company. This has induced the market price to move up. If the rumour is false, the ABC corporation stock price will probably fall dramatically. To protect from this an investor has bought the call and put options.

He purchased one 3 months call with a striking price of `42 for `2 premium, and paid Re.1 per share premium for a 3 months put with a striking price of `40.

(i) Determine the Investor's position if the tie up offer bids the price of ABC Corporation's stock up to `43 in 3 months.

(ii) Determine the Investor's ending position, if the tie up programme fails and the price of the stocks falls to `36 in 3 months.   **(May 2006 - 7 Marks) (May 2019 - RTP)(Study Material)**

ISOLUTION : 27

Cost of Call and Put Options

= (` 2 per share) x (100 share call) + (` 1 per share) x (100 share put)

= ` 2 x 100 + 1 x 100

= ` 300

(i) Price increases to `43. Since the market price is higher than the strike price of the call, the investor will exercise it.

     Ending position = (- ` 300 cost of 2 option) + (` 1 per share gain on call) x 100

               = - ` 300 + 100 Net Loss

               = - ` 200

(ii) The price of the stock falls to ` 36. Since the market price is lower than the strike price, the investor may not exercise the call option.

     Ending Position = (-`300 cost of 2 options) + (`4 per stock gain on put) x 100

               = - `300 + 400 Gain

= `100

*****

QUESTION 28 :

AB Ltd.'s equity shares are presently selling at a price of Rs 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 Rs 650 or a 30% chance that it will go down to Rs 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 Rs 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 5% for the three months period, what is the value of the option at the beginning of the period ?

What is the expected return on the option ?

SOLUTION : 28

(i) To compute perfect hedge we shall compute Hedge Ratio (A) as follows:

$$\Delta = \frac{C_1 - C_2}{S_2 - S_2} = \frac{100 - 0}{650 - 450} = \frac{100}{200} = 0.50$$

The investor should purchase 0.50 share for every 1 call option

Or, the investor should purchase 1 share for every 2 Call Option.

(ii) How the investor will be able to maintain his position if he purchase 0.50 share for 1 call option written.

(a) If price of share goes upto ` 650 then value of purchased share will be:

Sale Proceeds of Investment (0.50 x ` 650)	` 325
Loss on account of Short Position (` 650 - ` 550)	` 100
	` 225

If price of share comes down to ` 450 then value of purchased share will be: Sale Proceeds of Investment (0.50 x ` 450) ` 225

(iii) The Value of Option, say, P at the beginning of the period shall be computed as follows:

(` 250 - P) 1.05 = ` 225

` 262.50 - 1.05P = ` 225

` 37.5 = 1.05P

P = ` 35.71

(iv) Expected Return on the Option

Expected Option Value = (` 650 - ` 550) x 0.70 + ` 0 x 0.30 = `70

$$\text{Expected Rate of Return} = = \frac{70, 35.71}{35.71} \times 100 = 96.02\%$$

*****

QUESTION 29 :

The current market price of an equity share of Penchant Ltd is Rs. 420. Within a period of 3 months, the maximum and minimum price of it is expected to be Rs. 500 and Rs. 400 respectively. The risk-free rate of interest be 8% p.a.

ESTIMATE the value of a 3 months Call option using "Risk Neutral" method at the strike rate of Rs. 450.

Given $e^{0.02} = 1.0202$

SOLUTION : 29

Let the probability of attaining the maximum price be p

$(500 - 420) \times p + (400 - 420) \times (1-p) = 420 \times (e^{0.02} - 1)$

or, $80p - 20(1 - p) = 420 \times 0.0202$

or, $80p - 20 + 20p = 8.48$

or, $100p = 28.48$

$p = 0.2848$

The value of Call Option in Rs. $= \dfrac{0.2848 \times (500-450)}{1.0202} = \dfrac{0.2848 \times 50}{1.0202} = 13.96$

*****

QUESTION 30 :

"Investing in Stock Futures differs from investing in Equity Options in several ways". Explain.

(March 2023 MTP - 4 Marks)

SOLUTION : 30

Investing   in stock futures differs from investing in equity options contracts in several ways:

1. Nature: In options, the buyer of the options has the right but not the obligation to purchase or sell the stock. However while going in for a long futures position, the investor is obligated to square off his position at or before the expiry date of the futures contract.

2. Movement of the Market: Options traders use a mathematical factor, the delta that measures the relationship between the options premium and the price of the underlying stock. At times, an options contract's value may fluctuate independently of the stock price. In contrast, the future contract will much more closely follow the movement of the underlying stock.

3. The Price of Investing: When an options investor takes a long position, he or she pays a premium for the contract. The premium is often called a sunk cost. At expiration, unless the options contract is in the money, the contract is worthless and the investor has lost the entire premium. Stock future contracts require an initial margin deposit and a specific maintenance level of cash for mark to market margin.

*****

QUESTION : 31

Explain briefly the various factors that affect the value of an Option.

(April 2023 MTP - 4 Marks)

SOLUTION : 31

Factors affecting the value of an option are:

(a) Price Movement of the Underlying: The value of calls and puts are affected by changes in the underlying stock price in a relatively straightforward manner. When the stock price goes up, calls should gain in value and puts should decrease. Put options should increase in value and calls should drop as the stock price falls.

(b) Time till expiry: The option's future expiry, at which time it may become worthless, is an important and key factor of every option strategy. Ultimately, time can determine whether your option trading decisions are profitable. To make money in options over the long term, you need to understand the impact of time on stock and option positions.

With stocks, time is a trader's ally as the stocks of quality companies tend to rise over long periods of time. But time is the enemy of the options buyer. If days pass without any significant change in the stock price, there is a decline in the value of the option. Also, the value of an option declines more rapidly as the option approaches the expiration day. That is good news for the option seller, who tries to benefit from time decay, especially during that final month when it occurs most rapidly.

(c) Volatility in Stock Prices: Volatility can be understood via a measure called Statistical (sometimes called historical) Volatility, or SV for short. SV is a statistical measure of the past price movements of the stock; it tells you how volatile the stock has actually been over a given period of time.

But to give you an accurate fair value for an option, option pricing models require you to put in what the future volatility of the stock will be during the life of the option. Naturally, option traders don't know what that will be, so they have to try to guess. To do this, they work the options pricing model "backwards" (to put it in simple terms). After all, you already know the price at which the option is trading; you can also find the other variables (stock price, interest rates, dividends, and the time left in the option) with just a bit of research. So, the only missing number is future volatility, which you can calculate from the equation.

(d) **Interest Rate:** Another feature which affects the value of an Option is the time value of money. The greater the interest rates, the present value of the future exercise price are less.

*****

PROBLEM :- 32

Following is the information available pertaining to shares of Omni Ltd.:

|	
Current Market Price (`)	`**420.00**
Strike Price (`)	`**450.00**
Maximum Price (`) expected in next 3 months' time	`**525.00**
Minimum Price (`) expected in next 3 months' time	`**378.00**
Continuously Compounded Rate of Interest (p.a.) (%)	**8.00%**
e^{rt}	**1.0202**

From the above

(i) **Calculate the 3 months call option by using Binomial Method and Risk Neutral Method. Are the calculated values under both the models are same?**

(ii) ***State also clearly the basis of Valuation of options under these models.***

(Nov. 2023 Exam – 8 Marks)

SOLUTION. 33 :

(I) **(1) Call Option value using Binomial Model**

```
                              ↗ 525 (75)
        ` 420  <
                              ↘ 378 (0)
```
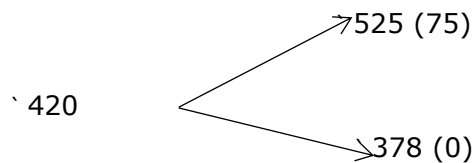
$$\Delta = \frac{₹525 - ₹378}{₹75 - 0} = 0.51$$

Initial Investment = 0.51 x 420 = 214.20

Value of Portfolio if Price goes down to ` 378

Value of holding 0.51 x ` 378 = 192.78

Accordingly Let 'P' be the option price, then

` 214.20 - P = ` 192.78/1.0202 = ` 188.96

P = ` 25.24

(2) Value of Call Option using Risk Neutral Method

Let ''P' be the probability of Price increase, then p x 525 + (1 - p) x 378 = 420(1.0202)

147p = 50.48

p = 0.34

Probability of Price increase = 0.34

Probability of Price decrease = 0.66

$$\frac{0.34 \times 75 + 0.66 \times 0}{1.0202} = ₹ 25.24$$

Yes, the value of option under both Models is same.

(ii) Basis of valuation of options :

- Binomial model uses an approach called " Risk less Hedge Approach" to find the price of the option, by creating a portfolio which will have same value at expiration irrespective of any price. Hedge means to create an equal and opposite position for protecting the value of portfolio.
- In Risk Neutral Model, valuation of options is based on arbitrage and is therefore independent of risk preferences; one should be able to value options assuming any set of risk preferences and get the same answer.

*****

PROBLEM :- 33

Explain in brief VEGA and RHO in OPTION VALUE   **(Nov. 2023 Exam – 2 Marks)**

SOLUTION. 33 :

(ii)   **Vega:** Sensitivity of option value to change in volatility. Vega indicates an absolute change in option value for a one percent change in volatility.

   For example, a Vega of 0.09 indicates an absolute change in the option's theoretical value will increase by 0.09 if the volatility percentage is increased by 1.0 or decreased by 0.09 if the volatility percentage is decreased by 1.0. Results may not be exact due to rounding. It can also be stated as the change in option price given a one percentage point change in volatility. Like delta and gamma, Vega is also used for hedging.

   Rho: Rho is the change in option price given a one percentage point change in the risk free interest rate. It is the sensitivity of the option value to change in interest rate. Rho indicates an absolute change in option value for a one percentage change in the interest rate.

   For example, a Rho of 0.06 indicates the option's theoretical value will increase by

   0.06 if the interest rate is decreased by 1.0.

*****

PROBLEM :- 34

Mr. A established the following strategy on the stock of D Ltd. which is currently trading at ` 1000 per share:

(1). Purchased one 3-month call option with a premium of ` 60 at an exercise price of ` 1100 per share.

(2). Purchased one 3-month put option with a premium of ` 10 at an exercise price of ` 900 per share.

Appraise the position of Mr. A if after 3-months the price of D Ltd. stock:

(i)   remains at ` 1000.

(ii)   falls at ` 700.

(iii)   rises to ` 1300.

Assume the option size is 100 shares of D Ltd.   **(March 2024 MTP – 4 Marks)**

SOLUTION. 34:

Total premium paid on purchasing a Call and Put option

   = (` 60 per share × 100) + (` 10 per share × 100).

   = ₹ 6,000 + ₹ 1000 = ` 7,000

(i)   In this case, Mr. A exercises neither the Call option nor the Put option as both will result in a loss for him.

   Accordingly, the Ending value = - ` 7,000 + zero gain = - ` 7,000

   i.e Net loss = ` 7000

(ii)   Since the price of the stock is below the exercise price of the Call, the Call will not be exercised. Only Put is valuable and hence is exercised. Accordingly,

   Total Premium paid = ` 7,000

   Ending value = − ` 7000 + ` [(900 – 700) × 100] = − ` 7000 + ` 20,000 = ` 13,000

∴ Net gain = ` 13,000

(iii) Since the price of stock rises above the exercise price of Put, the Put will not be exercised. Only Call is valuable and hence is exercised. Accordingly,

Total Premium paid = ` 7,000

Ending value   = – ` 7000 + ` [(1300-1100) × 100]

= - ` 7000 + ₹ 20000

Net gain = ₹ 13,000

*****

PROBLEM :- 35

You as an investor had purchased a 4-month call option on the equity shares of ABC Ltd. of ` 10, of which the current market price is ` 660 per share and the exercise price ` 750. You expect the price to range between ` 600 to ` 950. The expected share price of ABC Ltd. and related probability is given below:

Expected Price (`)	600	700	800	900	950
Probability	0.05	0.20	0.50	0.10	0.15

Evaluate the following:

(i) Expected Share price at the end of 4 months.

(ii) Value of Call Option at the end of 4 months if the exercise price prevails.

(iii) In case the option is held to its maturity, estimate expected value of the call option?

(APRIL 2024 MTP – 6 Marks)

SOLUTION. 35:

(i) **Expected Share Price**

= ` 600 X 0.05 + ` 700 X 0.20 + ` 800 X 0.50 + ` 900 X 0.10 + ` 950 X 0.15

= ` 30 + ` 140 + ` 400 + ` 90 + ` 142.50 = ` 802.50

(ii) **Value of Call Option**

= ` 750 - ` 750 = Nil

(iv) **If the option is held till maturity the expected Value of Call Option**

Expected price (X)	Value of call (C)	Probability (P)	CP
` 600	0	0.05	0
` 700	0	0.20	0
` 800	` 50	0.50	` 25
` 900	` 150	0.10	` 15
` 950	` 200	0.15	` 30
Total	` 70		

* If the stock price goes below ` 750, option is not exercised at all.

*****

PROBLEM :- 36

Mr. Shyam an investor is not sure about the expected price movement of the stock of Delta Corporation's share. His friend Adi advised him to go for option contracts if he wants to play in the market with limited risk. Adi

advised him to follow below mentioned Strategy.

(1) Purchase one 3-month call option with a premium of ` 30 and an exercise price of ` 550.

(2) Purchase one 3-month put option with a premium of ` 5 and an exercise price of `

450.

Delta Corporation's stock is currently selling at ` 500.

Demonstrate the net pay off position of Mr. Shyam at the expiry of option after 3-months if the price of Delta Corporation's stock happens to be:

(i)   **No change in price**

(ii)   **falls at ` 350**

(iii)   **rises to ` 600.**

Assume the option lot size is 100.   **(MAY 2024 RTP)**

SOLUTION. 36:

Total premium paid on purchasing a call and put option

= (` 30 per share × 100) + (` 5 per share × 100)

= ` 3,000 + ` 500 = ` 3,500

(i)   Net Pay-off if there is no change in price

In this case, Mr. Shyam exercises neither the Call option nor the Put option as both will result in a loss for him.

Ending value = - ` 3,500 + Zero gain = - ` 3,500

i.e. Net loss is ` 3,500

(ii) Net Pay-off if price falls at ` 350

Since the price of the stock is below the exercise price of the Call, it will not be exercised. Only Put is valuable hence it is exercised.

Ending value = − ` 3,500 + ` [(450 − 350) × 100] = − ` 3,500 +

` 10,000 = ` 6,500

∴ Net gain is ` 6,500

(iii) Net Pay-off if price rises to ` 600

In this situation, the put is worthless since the price of the stock exceeds the Put's exercise price. Only Call is valuable and hence it is exercised.

Ending value = - ` 3,500 + ` [(600 − 550) × 100] = - ` 3,500 +

` 5,000 = ` 1,500

∴ Net Gain is ` 1,500

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Hello Sir,
After studying the first group of CA final in just four months, I passed in the first attempt and the feeling is amazing. Scored 53 in FR and 63 in SFM.. writing paper was so easy because I was familiar with every question and logic which was taught by you... Taking your class was my one of the best decision in my life..
Also I want to share that my financial condition is not good to purchase lectures of any faculty.. literally I decided to start with self study but You offered your lectures at very low price and it was golden opportunity for me..the tears of joy in my mother's eyes after hearing the result reminded me of you....
The amount of respect I have for you is not something I can put into words..
THANK YOU GURUJI...!

-Rushikesh Pokalekar

Hello, sir you are the best teacher. You are the best faculty for practical subject as well as theory subjects. I really enjoyed your class. Lots of questions like all past questions, RTP, MTP, study material question solved in classroom. It is very helpful for me because lot of practice is needed to tackle the exam. Sir, your theory subject Economics is very helpful for me because it solves practical approach in the classroom, lots of examples.
Thankyou so so so much sir.

- Payal Ramesh Mali

Hello, I am Rushikesh Shrihari Puri, studied the FM-ECO subject under the guidance of CA Vinod Kumar Agarwal sir. Sir won't speak much more about himself but his pervasive domain of knowledge regarding subject he teaches even Accounts can enlighten your brain with great thoughts & knowledge. Just last words to say, that please & a humble request to take real guidance under his roof of knowledge for becoming CA & human too. Yes, this institute is not on marketing basis, it is on the experience of student to student.
So, enjoy your CA inter journey as we all have enjoyed

- Rushikesh Shrihari Puri

Vinod sir teaches with utmost conceptual clarity which helped me retain concepts very easily, with logical explanation is at peaks which helps solve tricky question very easily. All RTP, MTP and past year questions were solved in class itself and sir teaches in a way that develops your thinking process which would eventually lead to solving of hard questions in very efficient and effective way.
Thankyou Vinod sir for everything.

-Sarthak Nalawade

CA VINOD KUMAR AGARWAL'S STUDENTS
FEEDBACK

Sir,I have purchased your SFM class...and i have scored exemption in it! Just wanted to thank you for all the concept clarity and making the subject so easy...Your way of teaching was simply awesome because you have always given reason behind every concept...and hence we never have to mug up any concept. Thank u so much sir.
Regards,
Nishigandha R. Daulatkar

Hello sir Wanted to convey my thanks to you for your wonderful guidance in my SFM subject. Scored 72 marks I was not prepared for rest of the group so just jumped into SFM preparation and achieved exemption. It was just because of your wonderful conceptual clarity and guidance.
Regards,
Nishtha Chopra

Dear Sir,I am your virtual class student Mayuri Sutar. I have majorly done my CA Final classes with AS Foundation (FR, SFM, Audit and Costing) regular as well as revision classes.Your SFM revision lecture are really helping me to complete my syllabus in very short time.

Thnx for entire team for processing my order in a speedy way. Very happy to take classes from Vinod sir who has such a great heart in understanding the needs of students and providing classes at such affordable prices.I will repay my debt to Vinod sir by scoring Exemption in May 21 attempt and post the Mark sheet here itself...Once again thnx thnx thnx....a lot

Good morning,
I wrote only 2nd group in this May 2022 attempt and I cleared that group and I attended Risk Management class from Vinod sir and I got exemption in that and I got 60 marks in that subject.

-Sonia S

Hello sir you are really the best teacher forever for the chapter portfolio management even 1st standard student can understand the concepts thoroughly.thank you so much sir.
- Venkatalakshmi Lakshmi.

Respected Vinod Sir,
Sir your FR and SFM regular batch lectures really helped me in my interview . Received an internship offer from Tresvista for an Investment Research role . Thank you for all the classes.

Thanks & Regards, Joydeep Gorai

Hello.. I have taken FR and SFM class from Vinod Sir.
I scored 62 in FR and 64 in SFM.
My registration no. is ▮▮▮▮▮
I cleared CA in this attempt.
- Diganta Chowdhury

CA VINOD KUMAR AGARWAL'S STUDENTS
FEEDBACK

Thank you so much VK sir,
Your teaching techniques helped me a lot to take 73 marks.

Regards,
Manjunath Doddamani

I scored 68 in SFM.. all thanks to you...
From hating financial management in IPCC...to an exemption in CA final.. credits to you.

Thank you to Rakesh agrawal and VK sir.. I bought video lectures from A.S. Foundation. I got 59 marks in costing And 74 marks in FSCM. Thanks a lot

Regards,
Abarna J

Hello sir,Glad to share that I cleared CA final exam..Had cleared grp 2 in July attempt already..Scored exemption in FR & SFM..
Big big thanks to you !!
Thanks and regards,
CA Swapnil Kshirsagar

I took vinod sir's FR and SFM..scored exemption in both

Regards,
Shebin Sebastian

Sir today I cleared my CA final group 1 with exemption in all subjects I secured 63 in FR & 63 in SFM
Thanks a lot sir for your guidance :)

Please convey my message to Vinod Sir. Because of him I was able to pass when result is just 11%

I have done Vinod Sir's FR revision lecture's and able to score 55 Marks in FR. Thank you very much Vinod Sir. I cleared group 1

Regards,
Abhijit Mohan Lokhande

Hi Sir, I had secured exemptions in SFM(60) and FM(73) in previous attempts. SFM score helped me clear G1 this time.

Regards,
Kaushal

Sir, I cleared CA final in 1st attempt. Special thanks to VK Agarwal Sir for all his guidance and motivation 😊😊

Regards,
Siddhi Suman Parab

Hello sir I have taken CA final FR and SFM lectures from A.S Foundation. Now I have cleared both groups of CA Final

Regards,
Ashwani Kumar

I am very thankful to vinod sir. I cleared group 1 and scored 53 in SFM. Vinod sir's SFM class helps in clearing SFM.

Regards,
Ashutosh Kumar

I completed SFM revision it's good. Sir covered all concepts.
- Srinath Y.C

Dear Vinod Sir, Very well explained. In first 30 minutes sir has built the base with help of various examples.
-Milan Jeswani.

Hi sir. Good evening. I have taken SFM from you. I have cleared group-1.
I am very thankful to you sir.
I really loved the way you teach sir.
Regards
Sai Eshwar

I am also purchasing this sfm lectures and I have also done the FR from vinod sir by virtual classes ,it's really helpful and having easy understanding methods.

Ye sir hai jinke wajah se CA intermediate students ko bahut help milti hai. Aur to aur maine Vinod sir ke classes kiye hai. Inke jaise padhanewale kash hi koi ho sakate hai.
- Laxman Patil

Dear Vinod Sir, I've attended your FR and SFM regular classes. I liked it very much and I've recommended the same to my friends too. Many of my friends have already watched your class. Thank you so much sir.
Regards,
Anu

Vinod Kumar Agarwal sir-
• Teaches with 100% conceptual clarity,
• All of the queries are solved on emails within a day or two.
• Gives minimal homework,
• Almost all of the questions are solved in the class
• His lectures are effective
• The best thing is, in every chapter he teaches almost 60 questions whereas in ICAI material there are around 15 questions only
• Those questions includes ICAI material + Previous Exam questions + MTP RTP. So everything is covered
• He also, marks down the questions which seems to be important
• Although students of this generation tends more towards younger teachers maybe because they use humour, but the experience that VK sir has is exceptional!

-Saddab Idrisi

Hello Sir,
Bought your CA Inter Accounting Standards Group 2 book; I must say the book is so comprehensive that it covers everything in it.
I went through the lectures provided on YouTube, the way you covered the standards for examination purpose as well as for real life application was commendable.Thank you so much sir for all your efforts.

Regards,
Sakshi K

These is Unnat Chandak. I took CA Final FR classes from AS Foundation. Sir has taught us in very simple way and has covered all previous attempt paper questions in his book.His teaching techniques and practice questions helped me to get exemption in FR.

Respected Vinod Sir,
Good evening sir. Hope you are well . Sir I was from an engineering background enrolled in FR regular batch from Feb 2022 (online) . Sir, your teaching made me confident in FR.
Thank you for all the important lectures delivered by you. And books are very good for revision.
Will always be thankful to you for FR .

Thank & Regards
Name - Joydeep Gorai

Hi...i took risk management classes from Vinod sir...I cleared my 2nd grp of CA final.. scored good marks in Risk management...

Notes of risk management helped me a lot
-Supriya paygude

CA VINOD KUMAR AGARWAL'S STUDENTS
FEEDBACK

Subject : CA Final SFM Face-to-Face Batch

In the era of online/pen-drive lectures, it was great to have an opportunity to attend SFM classes face to face by VK Agarwal sir.

The portion was covered extensively & main focus was given on conceptual understanding. Face to Face batch helped me in covering full potion efficiently. Sir has taught SFM in such a way that now it feels easy & it has given me confidence that I can score marks in it & get exemption as well.

The class has been engaging & sir's enthusiasm to teach us is infectious & makes us excited to study more & love the subject.

He has covered all types of questions in the class not just from ICAI material but also from other reference material.

- Meenal Malpote

SFM Revision Batch

The batch was awesome & I got maximum out of it, that I could. Almost every concept was explained with detailed explanation, followed by solving problems in the class. Didn't have to mug up any rule or concept because it was explained thoroughly. Practice booklet provided by you have lots of problems that a student can do after chapters are over. The material was updated perfectly having latest types of sums asked by ICAI, even the RTP, MTP and exam questions of may 2023 were covered.

This batch was great covering huge syllabus in just 30 days. Thnakyou sir.

-Champak Dixit

Face to face batches are the essence of learning and I have rediscovered the joy of studying after doing this SFM fully exam oriented face to face batch.

Sir has covered all concepts and has made us solve all varieties of questions in this short amount of time. Doing video lectures was taking very long & was not as fun as doing face to face lectures. I was lucky to find this batch and I'm amazed how quickly we were able to cover all of SFM, this has saved me a lot of precious time & has opened the doors for considering giving both groups.

The way sir has taught us, it made me understand and grasp all chapters. The notes given are concise & precise & easy for revision. I'm very confident in this subject now & I have also joined the FR Fully exam oriented face to face batch.

Sir has brought back my joy of learning. He is one of the rare faculties who is less interested in marketing & strives to help students in every way possible.

-Ajit Pawar

Hello Sir,

I am Abhay Singh From Chhindwara .

I want to express my heartfelt gratitude to you Sir, for providing free of cost class. I'm fortunate for receiving knowledge from the very experienced teacher V.K Agarwal Sir.

When I started your lecture it seemed very easy from me to understand the concept because you are providing indepth knowledge about every concept.

Alongwith it, you tell us about which topic is important for exam and also the question which is frequently asked in the exam .

And the Advanced Accounts Book is so precise that I am getting all MTP, RTP, previous year questions in a single book which helps me to get more practice of a variety of question in single compact book.

Thank you so much sir!

-Abhay Singh