2. Derivative (options)

1. Contract which give right to buy or sell an underlying is known as option contract.

2. Call option → Holder of Call option will get a right to buy an underlying at strike price.

3. Put option → Holder of put option will get a right to sell an underlying at strike price.

4. BEP of Call option = Strike Price + Premium

5. BEP of put option = Strike Price − Premium

6. maximum loss

→ to writer → unlimited
→ to holder → Premium paid

7. Maximum Gain

→ to writer → Premium received
→ to holder → unlimited

8. Intrinsic value of Call option = Current market Price − Strike price

9. Intrinsic Value of put option = Strike Price − Current market Price

(10) Strategy in option

(a) Long Call

(b) Short Call

(c) Long put

(d) Short put

(e) Long strangle Strategy

→ Long Call option at high strike price

→ Long put option at low strike price

(f) Short strangle Strategy

→ Short Call option at high strike price

→ Short put option at low strike price

(g) Long Straddle Strategy

→ Long Call option & long put option at same strike price

(h) Short straddle Strategy

→ Short Call option & Short put option at same strike price

(i) Butterfly Strategy

→ 1 long Call at high strike price

→ 2 Short Call at mid strike price

→ 1 long Call at low strike price

(11) Strike price is also known as exercise price or execution price.

(12) Method of Calculating fair value of option

(a) General method

- Fair value of option = $\dfrac{\text{Pay off}}{(1+i)^n \text{ or } e^{rt}}$

→ Pay off → Difference between strike price & expected price

If expected price is not given

- Call premium = Ex-dividend spot price − Present value of strike price

- Put premium = Present value of strike price − Ex-dividend spot price.

(b) Put Call parity method

↓

applicable when put premium is given and call premium is to be calculated & vice-versa.

- Call premium = [Ex-dividend spot price − PV of strike price] + Put premium

- Put premium = [Present value of strike price − Ex-dividend spot price] + Call premium

(c) Binomial model

↓

applicable when two expected price is given

Step-1 → Probability of attaining high price $= \dfrac{\text{Spot price} \times (1+i)^n - \text{low price}}{\text{High price} - \text{low price}}$

or

$$\frac{R-d}{U-d}$$

here $R = (1+i)^n$ or e^{rt}

$U = 1 + \%$ of up movement

$d = 1 - \%$ of down movement

Step-2 → Probability of attaining low price $= 1 -$ Probability of attaining high price

Step-3 → Expected pay off $=$ [Pay off at high price × Probability of attaining high price]

+

[Pay off at low price × Probability of attaining low price]

Step-4 → $C_0 / P_0 = \dfrac{\text{Expected Pay off}}{(1+i)^n \text{ or } e^{rt}}$

(d) Black Scholes model

(i) $C_0 = \left[\text{Ex-dividend Spot price} \times N(d_1)\right] - \left[\text{PV of Strike price} \times N(d_2)\right]$

(ii) $P_0 = \left[\text{PV of strike price} \times (1 - N(d_2))\right] - \left[\text{Ex-dividend Spot price} \times (1 - N(d_1))\right]$

here

$$D_1 = \frac{\ln\left[\frac{\text{Ex-dividend Spot price}}{K}\right] + \left[R_F + \frac{\sigma^2}{2}\right] \times t}{\sigma \times \sqrt{t}}$$

$$D_2 = D_1 - (\sigma \times \sqrt{t})$$

here

K = Strike price

R_F = Risk free return

(13) Option Greek

- **Delta** → Change in option premium due to change in underlying price
- **Gamma** → Change in Delta due to change in underlying price
- **Theta** → Decrease in option premium due to change in time by 1 day
- **Vega** → Change in option premium due to change in implied volatility
- **Rho** → Change in option premium due to change in interest rate