National Conference on “Valuation Standards”

ESOP Valuation

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Learning Objective

- What is an Option?
- Introduction to ESOPs
- Valuation of Stock Option
- Intrinsic Value Method
- Fair Value Method
- Query Redressal


WHEN
WHO
?
WHAT
HOW
WHY
WHERE

What is an Option?

- Derivative is an arrangement / product whose value is determined from / is dependent upon the value of an underlying asset such as commodity, currency or security.

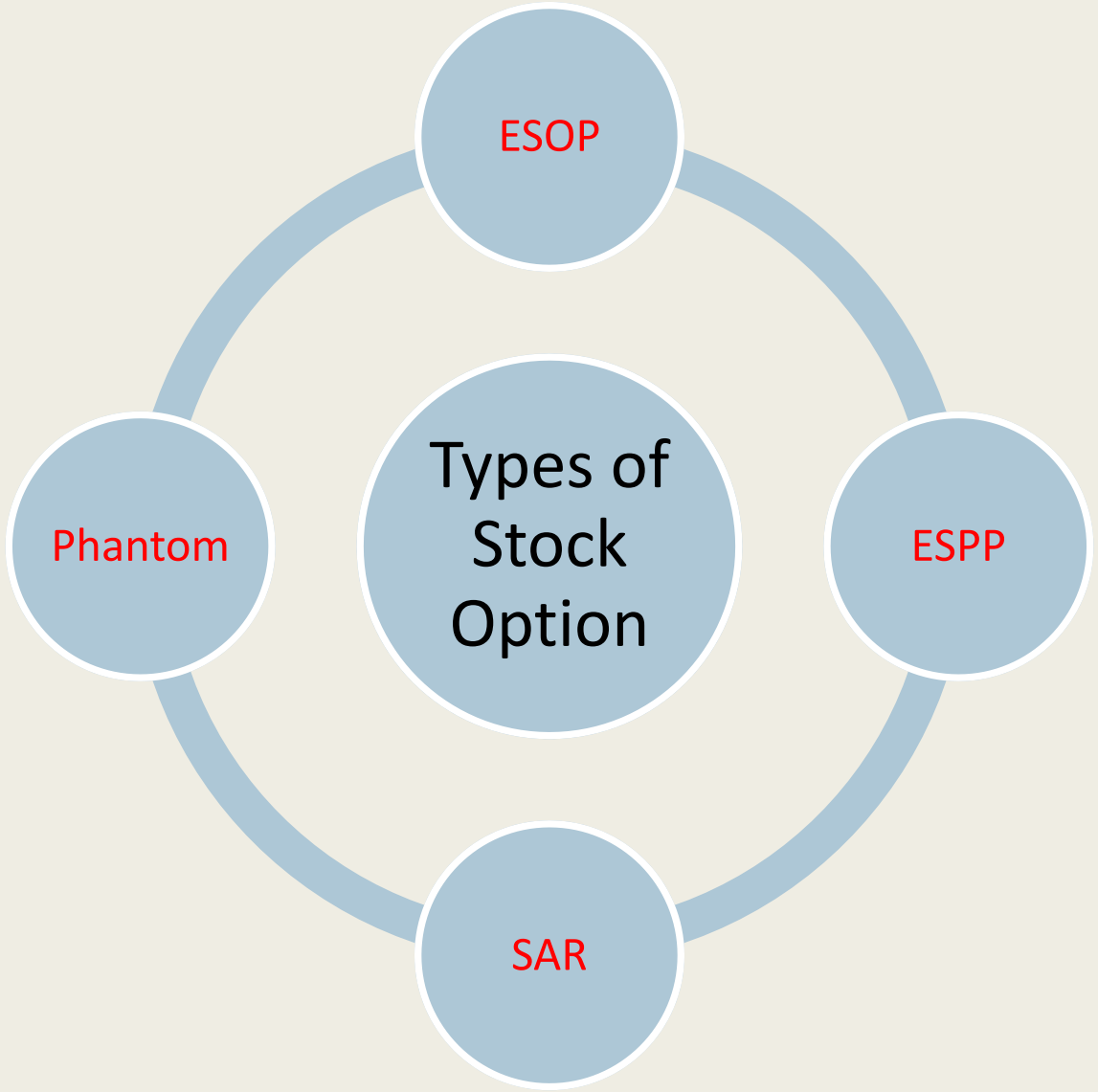
- Option is a contract that gives the owner
  - *A right but not an obligation*
  - *To either buy or sell*
  - *Specified underlying asset*
  - *At a specified price*
  - *At or within a specified time*

- Employee Stock Option is a right given to an employee to buy certain specified number of equity shares of the company at a pre determined price over a period of time subject to fulfillment of vesting condition.

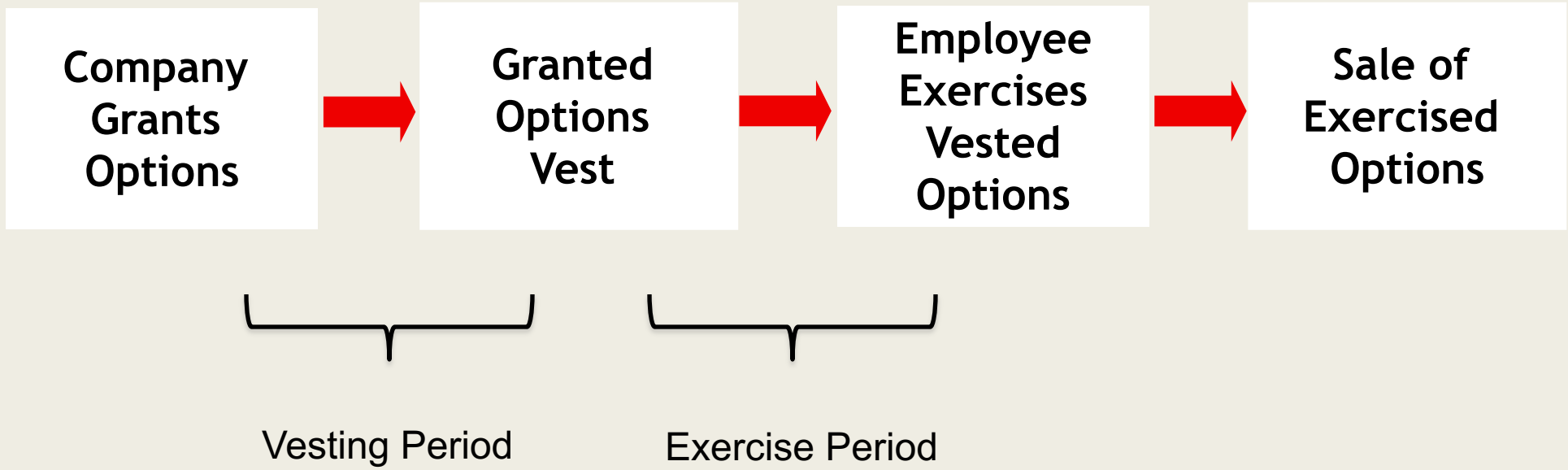
Categories of Options

Type	CALL Option / PUT Option
Exercisability	American Option / European Option
Payoff	In the Money / At the Money / Out of the Money

Introduction to ESOPs



Introduction to ESOPs



Stock Option - Category of Option?

Type	CALL Option
Exercisability	American Option but with conditions
Payoff	At the time of grant either In the Money / At the Money

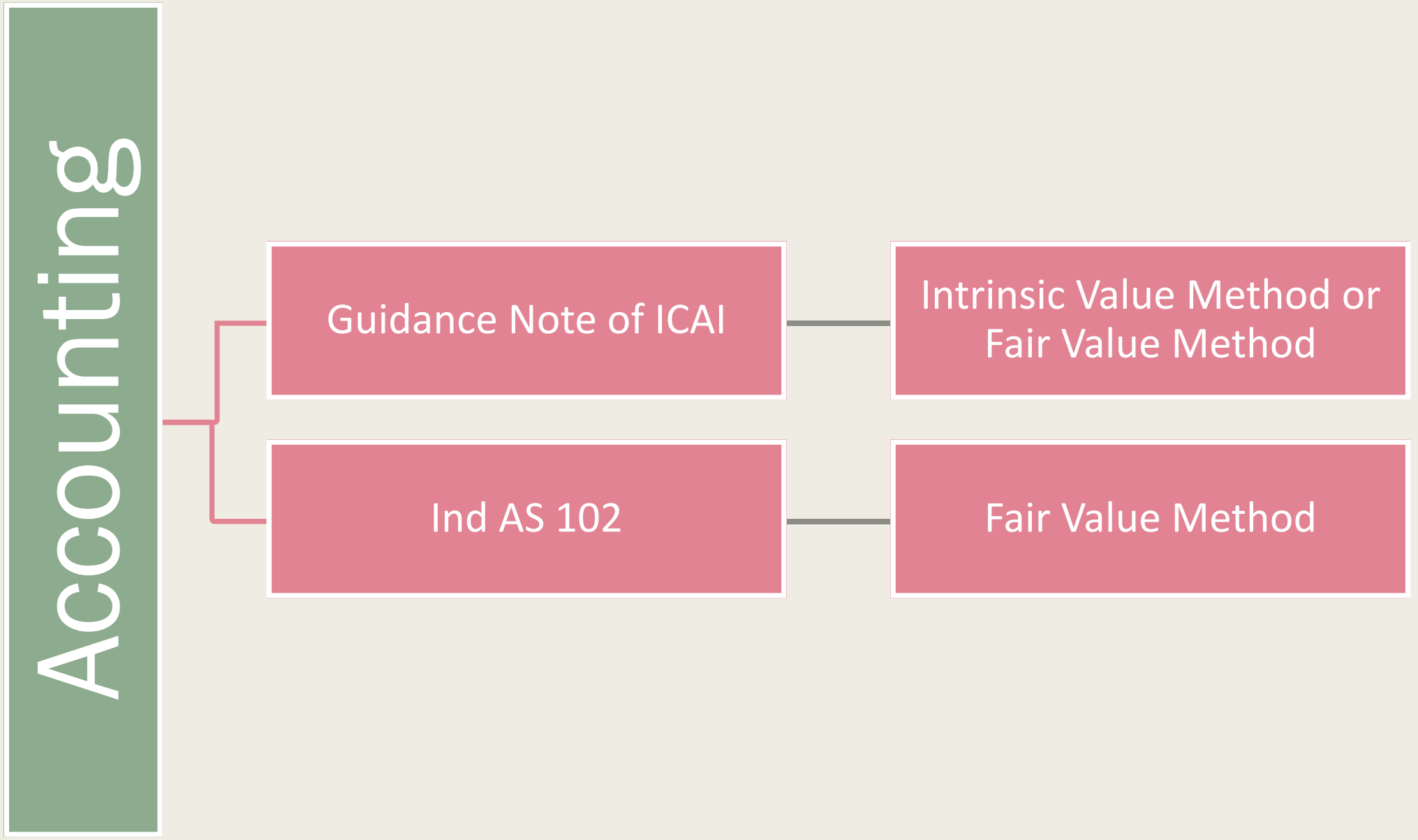
Timing of Stock Option Valuation

- At the time of Grant
  - Management: To assess the value being shared with the employee and determine number of Options to be granted.
  - Accounting: To determine the aggregate accounting impact and amortization of the same over the vesting period.

- At the end of each financial year
  - Accounting: Required only in case of cash settled Options.

- At the time of Exercise
  - Option value is not determined but intrinsic value of equity share is determined to calculate the perquisite value in the hands of the employee.

Stock Option Accounting in India



Intrinsic Value of an Stock Option

- Intrinsic value is the difference between the fair market value of the underlying equity share and the exercise price / grant price of an employee stock option.

Example – If an employee stock option is granted on 1st January at an exercise price of Rs.25/- per Option and the fair market value per share is Rs.100/- as on the previous day end then:

Intrinsic Value = 100 – 25 = Rs.75/- per Option

Fair Value of an Stock Option

- Fair value of Options is to be calculated using any binomial valuation method which takes into consideration the following variables:
  - *Fair market price of share as on the date of grant*
  - *Exercise price*
  - *Volatility in share price*
  - *Expected Life*
  - *Risk free interest rate*
  - *Dividend yield*

- Methods for calculation of fair value of Employee Stock Option
  - Black Scholes Merton Model *(Most widely known and used)*
  - Monte Carlo *(Rarely used for ESOP valuation)*
  - Binomial Model *(Rarely used for ESOP valuation)*

Variables used in Stock Option Valuation

- Fair market price of the underlying asset:
  - This is the fair market price of equity share of the company as on the date of grant.
  - If company is listed:
    - Available share price can be used.
    - Previous day's closing price is considered as fair market value as on date of grant.
    - In case shares are listed on two or more exchanges then price from stock exchange with highest volume on previous day is considered.
  - If company is unlisted:
    - Valuation of equity shares to be derived using standard valuation methods.
    - Valuation once taken is valid for a period of 6 months.

Variables used in Stock Option Valuation

- Exercise price per Option:
  - This is the price at which an employee is eligible to exercise the vested options.
  - This price is stated in the grant letter issued by the company to the employee. Generally this is a fixed number but in some case this may be conditional.
  - Generally, listed companies grant options at an exercise price equivalent to the prevailing share price as on the date of grant and unlisted companies grant options at a discount to the prevailing share price as on the date of grant.

Variables used in Stock Option Valuation

- Volatility in Share Price:
  - This is the expected level of fluctuation in the share price of the company over the expected life of the Option.
  - In case of listed company, this is calculated based on the historic share price of the company.
  - However, in case of unlisted company this is calculated based on share price of comparable company/ies, index of the respective vertical in which the company belongs.

Variables used in Stock Option Valuation

- Expected Life of the Option:
  - This is the expected time of the option and not total life of the option.
  - Factors to be considered:
    - Vesting period.
    - Exercise period.
    - Expected early exercise based on historical data.
    - Grouping of employees with similar exercise pattern can be done and then weighted average life to be considered.
    - In case of graded vesting, weighted average life of each vesting need to be considered.
  - Expected life of an option cannot be lesser than the vesting period of the Option.

Variables used in Stock Option Valuation

- Risk Free Interest Rate:
  - This is to be considered as on the grant date.
  - Yield to maturity on government bonds is considered for the purpose of risk free rate.
  - Tenure of government bonds equivalent to the expected life of Options is considered.

Variables used in Stock Option Valuation

- Dividend Yield:
  - Stock Options are not eligible for any dividend. However, share price reduces on account of payment of dividend.
  - In case company is declaring dividend on regular basis then average dividend should be considered.
  - Average share price for past 1 year as on the date of exercise is to be considered since yield is calculated as % of fair value and not as % of face value.

Black Scholes Merton Method

- Developed by 3 economists viz: Fischer Black, Myron Scholes and Robert Merton

- This model uses all the variables as required to be considered for Stock Option valuation.

- This model is based on following assumptions:
  - The option is European style option which can be exercised only at the end.
  - Share price follow a lognormal distribution based on principle that asset prices cannot be negative.
  - No transaction cost is considered.
  - Interest rates are assumed to be constant.

- This model is used and accepted across the world for the purpose of calculation of stock option value.

Black Scholes Merton Method

- The formula to calculate the option value is very complex.

$$C = SN(d_1) - N(d_2)Ke^{-rt}$$

$$d_1 = \frac{\ln\left(S/K\right) + \left(r + s^2/2\right)t}{s \cdot \sqrt{t}}$$

$$d_2 = d_1 - s \cdot \sqrt{t}$$

C = Call premium
S = Current stock price
t = Time until option exercise
K = Option striking price
r = Risk-free interest rate
N = Cumulative standard normal distribution
e = Exponential term

s = St. Deviation
ln = Natural Log

- Simple Interpretation of above – It represents present value of expected payoff on the option at the time of expiry.

- Note this value is net of exercise price.

- Instead of developing the formula in excel, it is recommended to use online calculators.

Black Scholes Merton Method

- Relation between variables and Black Scholes Option Value:

Variable	Particulars	Black Scholes Value
Stock Price	Increase	Increase
Exercise Price	Increase	Decrease
Volatility	Increase	Increase
Life of Option	Increase	Increase
Risk Free Rate	Increase	Increase
Dividend Yield	Increase	Decrease

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