~~st~~ forward price = 2050 ↗ + ↑ −

Dt.: Pg.:

Soln 1:

Spot price	Profit/Loss
1400	+650×1000
1500	+550×1000
1560	+490×1000
1600	+450×1000
1800	+250×1000
2050	0
2200	−150×1000
2300	−250×1000
2400	−350×1000

Soln 2: a) Spot price when position is closed = 5.80 per bushel

→ Profit = (5.80 − 5.20) × 5000
↳ contract covers 5k bushels
= $3000

b) ~~Forward~~ future price = 1.60 per pound
spot price = 1.40 per pound
I have entered short future contract
→ Profit = (1.60 − 1.40) × 37500 = $7500

c) 40 short SPI(200) future contracts
& future price (7500 index pts) < spot price (7800 index pts)

→ loss = (7800 − 7500) × $25 × 40
= $300000

d) → long Stainless steel futur contracts
future price = Rs 15000 per metric tonne
spot price = Rs 13500 per metric tonne
→ loss = 1500 × 3 × 5 = $22500 Rs
↳ contract covers 5 metric tonnes

Date: / /

3). Futures contract is an agreement to buy or sell an asset at a future date at a predetermined price whereas spot contract is an immediate purchase/sale of an asset at current market price.

The workflow of futures contract goes as follows:

(i). Creation of contract:
Futures exchanges of the commodity are selected.

(ii). Trading:
Buyers and sellers enter into contracts via brokers.

(iii). Holding or Offsetting:
Traders can hold till maturity for physical delivery or offset/close their position before expiry by taking an opposite trade.

(iv). Settlement:
Either cash-settled or physically delivered.

Commodity exchanges:

- define contract size, quality, delivery date and location.
- provide an electronic system for buyers and sellers
- reduce counterparty risk.
- coordinates physical delivery.

4). Premium : \$3 ; Strike price (K) : \$10 ; Current stock price (S_0) : \$42

Payoff at maturity : $\max(0, K - S_T)$

Profit = Payoff - Premium

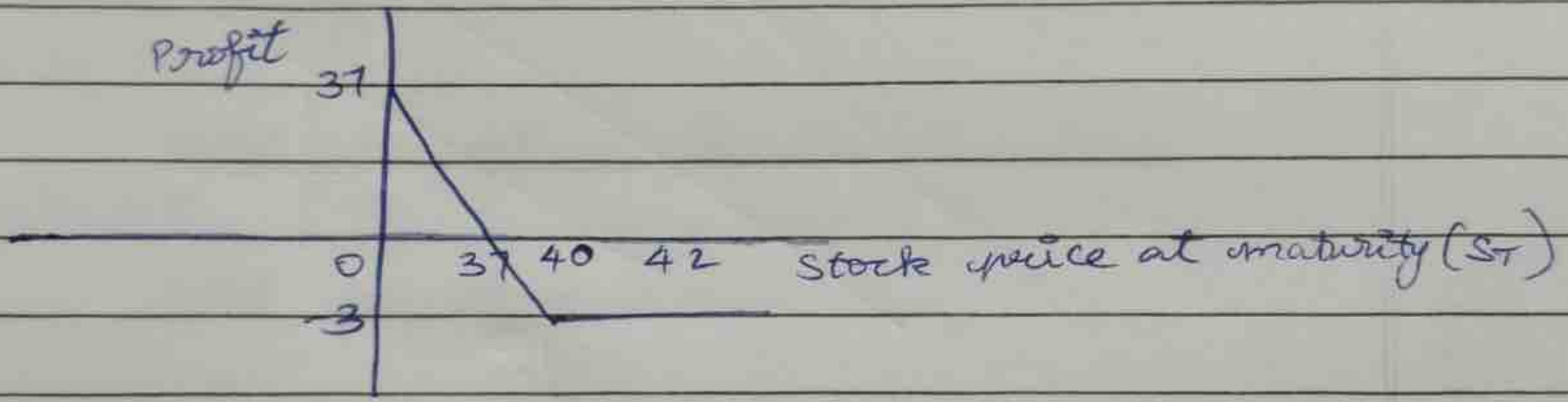
Profit is made only when payoff > premium.

$$K - S_T > 3$$

$$S_T < 37.$$

Put option is exercised when it is in the money, ie, when the strike price is greater than stock price at maturity

$$S_T < 40.$$



Date: / /

5). Forward price at setup (F) : Strike price of put.
Spot price of the asset at maturity (S_T).
strike price of the put and call : $K = F$.

Long forward contract payoff at maturity :

$$\text{Payoff}_{\text{forward}} = S_T - F$$

Long put option payoff at maturity :

$$\text{Payoff}_{\text{put}} = \max(F - S_T, 0)$$

Total terminal value of the portfolio :

$$\text{Total payoff} = S_T - F + \max(F - S_T, 0).$$

When $S_T \geq F$,

$$\text{Total payoff} = S_T - F.$$

When $S_T < F$,

$$\text{Total payoff} = 0.$$

$$\text{Terminal payoff expression} = \begin{cases} S_T - F & ; \text{if } S_T \geq F \\ 0 & ; \text{if } S_T < F \end{cases} = \max(S_T - F, 0)$$

This is exactly the payoff of a European call option with strike price F and maturity T.

The result follows from Put-Call Parity for European options:

$$C - P = S_0 - Ke^{-rT}$$

If $K = F = S_0 e^{rT}$,

$$C - P = S_0 - Ke^{-rT} = S_0 - S_0 = 0 \Rightarrow C = P.$$

Value of European Call = Value of European Put.

Sol^n 6 Put-call parity eq^n

$$c - P = S_0 - K e^{-rT}$$

(T → annual; r → risk free rate)

$c = 20$, $P = 5$, $S_0 = 130$, $K = 120$, $T = 12 = 1$ year

$$\Rightarrow 15 = 130 - 120 e^{-r}$$

$$120 e^{-r} = 115$$

$$r = \ln\left(\frac{120}{115}\right) = 0.0425$$

$\Rightarrow r = 4.25\%$ (annual risk free rate).

contributions: Garvit − 1, 2, 6

Jayaraman − 3, 4, 5