Q2) a) long $5000 \times 5.20 = 26,000$

$5000 \times 5.80 = 29,000$

profit $= 3000$

b) short $37500 \times 1.60 = 60,000$

$37500 \times 1.40 = 52,500$

profit $= 7500$

c) short $40 \times 7500 = 300,000$

$40 \times 7800 = 312,000$

loss $= 12,000$

d) long $5 \times 3 \times 15000 = 225,000$

$5 \times 3 \times 13500 = 202,500$

loss $= 22,500$

→ $K = F_0$ the strike of the European Put
→ S_T the spot price at maturity

Portfolio:

- Long one forward (payoff $S_T - F_0$)
- Long one European put with strike $K = F_0$ (payoff $\max\{K - S_T, 0\}$)

So, at T

$$\Pi_T = S_T - F_0 + \max\{F_0 - S_T, 0\}$$

So.

$$\Pi_T = (S_T - F_0) + (F_0 - S_T) \text{ if } S_T < F_0$$
$$= 0$$

and

$$\Pi_T = (S_T - F_0) + 0 \quad \text{if } S_T \geq F_0$$
$$= S_T - F_0$$

That is exactly payoff of European Call with strike $K = F_0$.

$$\Pi_T = \max\{S_T - F_0, 0\}$$

At maturity the two-instrument portfolio have same payoff as the European call with that strike and maturity.

1. <u>Short Forward Contract</u>

Profit or loss = (Forward Price - Spot Price) X 1,000

Forward Price = $2050 per ounce

Spot Price ($)	Profit or loss ($)
1400	6,50,000
1500	5,50,000
1560	4,90,000
1600	4,50,000
1800	2,50,000
2050	0
2200	-1,50,000
2300	-2,50,000
2400	-3,50,000

Put - Call Parity : Risk - Free Rate

→ Using the European put - call parity for a non - dividend stock:

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

T = 12 months , Strike Price (K) = 120
C = \$20 P = \$5
Current Stock Price (S) = \$130

Plugging in the values,

$$\Rightarrow 20 - 5 = 130 - 120 \times e^{-r \cdot 1}$$

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

$$\Rightarrow e^{-r} = \frac{115}{120} = 0.9583$$

Taking log on both sides,

$$\Rightarrow -r = \ln(0.9583)$$
$$\Rightarrow -r = -0.0429$$
$$\Rightarrow r = 0.043$$

5. Portfolio of Forward + Put Option

Let T be the time of maturity.

→ F_0 be the forward price agreed at time 0. (so the forward payoff at T is $S_T - F_0$), Q3 (A)

FUTURE CONTRACT	SPOT CONTRACT.
① Agreement to sell/buy at a future date	Agreement for immediate purchase/sale.
② Price: agreed today, settled in future	Based on current market price.
③ Settlement: on contract's maturity date	Immediate (usually T+2days)
④ Standardized terms (quantity, quality)	customised b/w buyer & seller.

(B) How does a futures contract work on commodity exchange?

① Consider a buyer & seller agree to a standardised contract via commodity exchange (wheat futures contract)

② The contract specifies
1) Quantity
2) Quality grade.
3) Delivery date (say after 3 months)
4) Futures price. (₹ x / quintal)

③ Both parties deposit margin with the exchange to reduce default risk.

④ The position is marked to market daily & margin is adjusted accordingly.

⑤ On maturity, either physical delivery takes place. Parties square off their positions & settle profit/loss.

(C) ROLE OF COMMODITY EXCHANGE:-

① contracts are pre-defined in terms of quality, quantity & expiry.

② Handling by the clearing house which acts as the counterparty to both buyer & seller.

3) Collects initial & maintenance margin to ensure both parties honor the contract

4) Adjusts profit / loss daily to avoid accumulation of large risk.

5) Ensures delivery of commodity (if opted) as per contract terms / enable cash settlement.

(Q4) OPTION TYPE $\Rightarrow$ European Put.

$P = \$3$ $\qquad K = \$40$.

$S_0 = \$42$

$\text{Payoff} = \max(K - S_T, 0)$

$\text{Profit} = \text{Payoff} - \text{Premium}.$

(i) To make a profit :-

$\text{Profit} = \max(K - S_T, 0) - 3 > 0$

$\Rightarrow (K - S_T) > 3$

$S_T < K - 3 = 37$

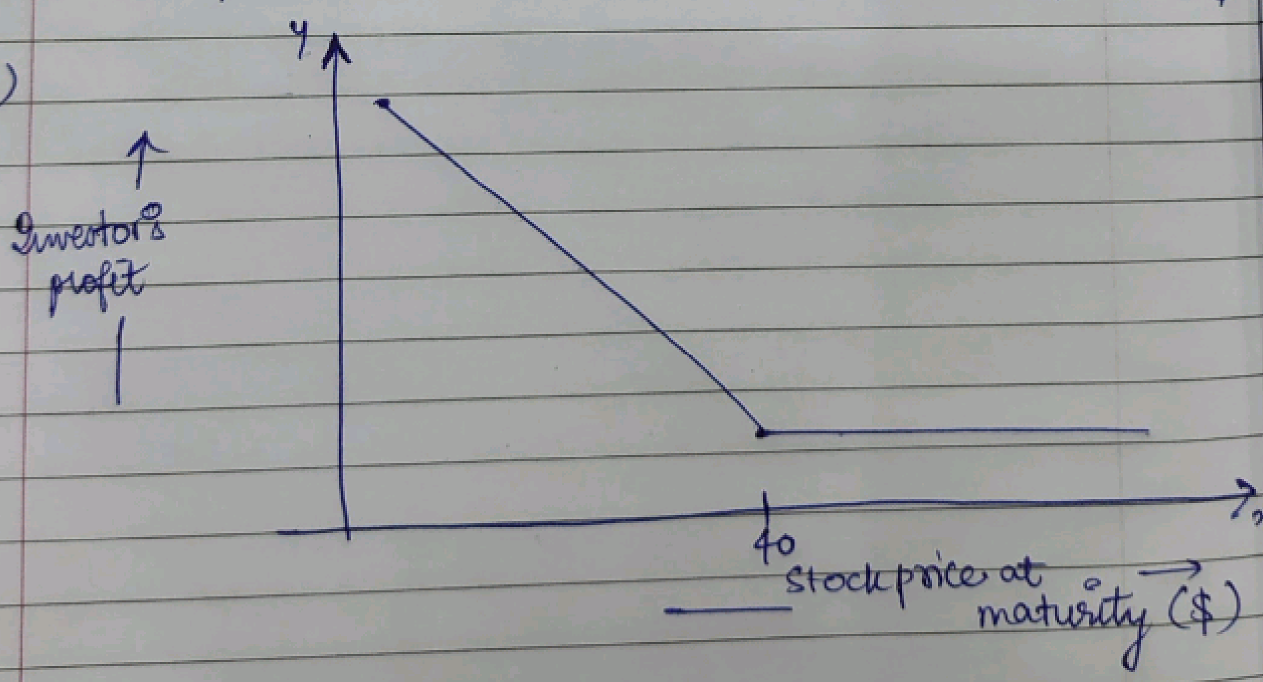
Ans= if stock price at maturity is less than \$ 37.

(ii) when Strike price > Stock Price at Maturity

$K > S_T \Rightarrow$ Put is exercised when $S_T < 40$

so the option is exercised if the stock price falls below 40 \$

iii)



	Assn 2.1	Assn 2.2
Sonali :	Q 1, 5	Q 1, 5, 6
Harshita :	Q 3, 4	Q 3, 4
Himanshi :	Q 2, 6	Q 2