1. Forward price = $2050

No. of ounces = 1000

$$P/L = (F.P - \text{Spot Price}) \times \text{ounces}$$
$$= (2050 - S.P) \times 1000$$

Spot-Price ($)	Profit/Loss ($)
1400	+ 650,000
1500	+ 550,000
1560	+ 490,000
1600	+ 450,000
1800	+ 250,000
2050	+ 0
2200	- 150,000
2300	- 250,000
2400	- 350,000

+ve = profit

-ve = loss

3. Spot Contract: agreement to buy/sell an asset for immediate delivery at current market price, known as spot price

Future's Contract: Standardized, exchange-traded agreement to buy/sell at a predetermined price on a future date.

Spot Contract	Futures Contract
→ Immediate transaction & delivery	Agreement to transact on a specified future date
→ Price determined by current market value (spot price)	Price predetermined using factors like cost of carry & expectations of future prices
→ No further obligations after settlement	→ Both parties are obliged to fulfill contract at expiration regardless of spot value at the time

Q2

$$\text{Profit}/\text{Loss} = (\text{Selling price} - \text{Buying price}) \times \text{Contract size} \times \text{No. of contracts}$$

a) Buy = $5.2
   Sell = $5.8

$$\therefore \text{Profit} = (5.8 - 5.2) \times 5000 \times 1$$
$$= 0.6 \times 5000$$
$$= \$3000$$

b) short →
   Sell = $1.6
   Buy = $1.4

$$\therefore \text{Profit} = (1.6 - 1.4) \times 37500 \times 1$$
$$= 0.2 \times 37500$$
$$= \$7500$$

c) short →
   Sell = $.7500
   Buy = $78000

$$\therefore \text{Loss} = (7500 - 7800) \times 25 \times 40$$
$$= 300 \times 25 \times 40$$
$$= \$300000$$

d) long →
   Sell - 13500 RMB
   Buy - 15000 RMB

$$\therefore \text{Loss} = (13500 - 15000) \times 5 \times 3$$
$$= 1500 \times 5 \times 3$$
$$= 22500 \text{ RMB}$$

Q4) a) Profit $= \max(40 - S_T, 0) - 3 > 0$

$$\therefore \max(40 - S_T, 0) > 3$$

$$\therefore S_T < 37$$

$\therefore$ profit iff stock price at maturity, $S_T < 37$

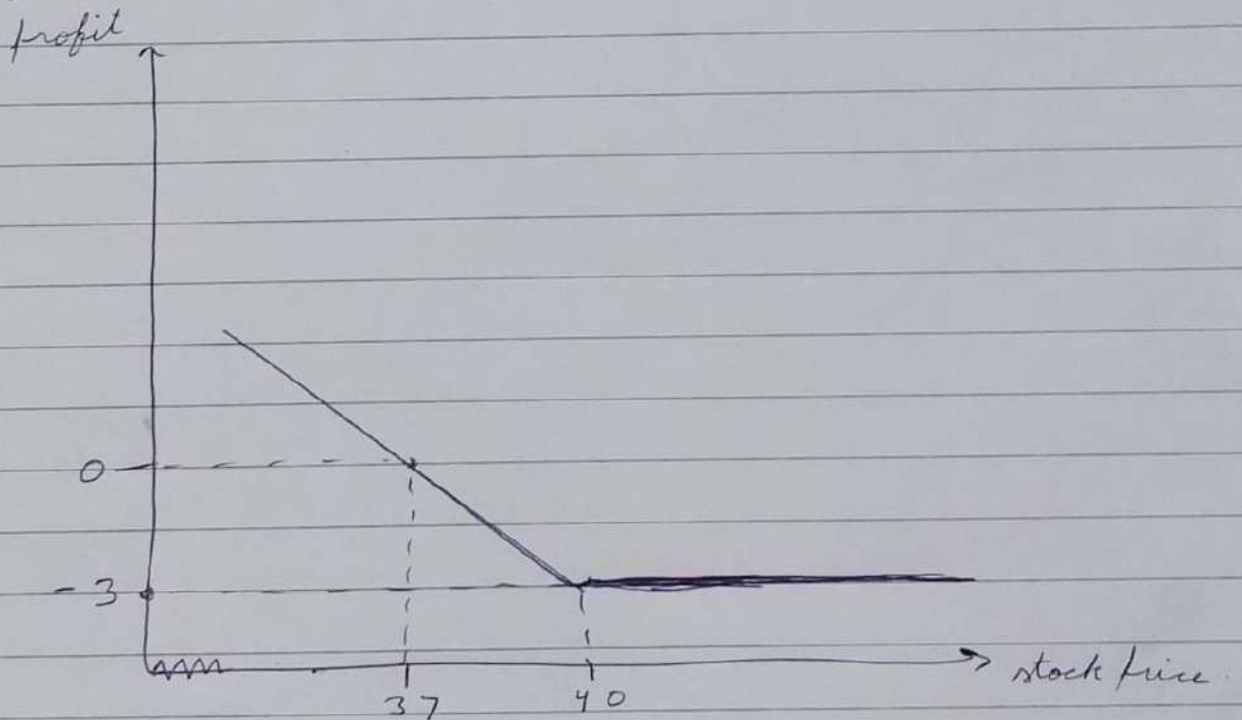b) option will be exercised when payoff > 0

$$\therefore 40 - S_T > 0$$

$$\therefore S_T < 40$$

To minimise loss or generate profit.

c) for $S_T \geq 40$, profit $= -3$

for $37 \leq S_T < 40$, profit $= 37 - S_T$ (-ve)

for $S_T < 37$, profit $= 37 - S_T$ (+ve)

→ Often over-the-counter and flexible	→ Highly standardized and is exchange-traded
→ Used for immediate needs/transactions	→ Used for hedging, speculation or risk-management

Future contracts traded on commodity exchange:
- ⌐ are highly standardised, with set contract size, quality, delivery location, expiration date. Only price is left negotiable to both parties.
- ⌐ used to take place in open outcry pit, but now electronically through a broker.
- ⌐ all trades are cleared by a central clearing house to eliminate counterparty risk by guaranteeing trades.
- ⌐ Traders post margin & contracts are marked-to-market daily
- ⌐ are mostly closed before its expiry, and if held to maturity, they settled by physical delivery/cash settlement as agreed upon.

5. • For a newly-entered-into long forward contract on asset:
you agree to buy asset at time T for forward price F_0 when it would cost S_T

• European put option with a long position:
you buy put option (right to sell at F_0 at time T), same as top asset.

Terminal value $= (S_T - F_0) + \max(F_0 - S_T, 0)$

case 1: $S_T \geq F_0$
terminal value becomes $(S_T - F_0)$

case 2: $S_T < F_0$
terminal value becomes 0

∴ terminal value $= \max(S_T - F_0, 0)$

⌐ same as a European call option

Q6)
$$C - P = S_0 - Ke^{-rT}$$

$C = 20\ \$$, $P = 5\ \$$, $S_0 = 130\ \$$, $K = 120\ \$$, $T = 1\ yr$

$15 = 130$

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

$$e^{-r} = 0.958$$

$$-r \ln_e e = \ln(0.958)$$

$\therefore\ \boxed{r = 4.26\%}$ ← per annum
(compounded)