**Problem 1:**

New delta = Old delta + Gamma \* (New stock price – Old stock price)

=> New delta = 0.6 + 0.05 \* 5 = 0.85

For the position to be delta neutral, the net delta should be zero. Assuming the position is initially delta neutral, the number of shares of the underlying stock which you need to be short = Old delta \* Number of call options long = 0.6 \* 100 = 60. Similarly, for the position to be neutral after the price increase, the number of shares of the underlying stock which you need to be short = New delta \* Number of call options long = 0.85 \* 100 = 85. Hence, to remain delta-neutral you need to sell 85-60 = 25 shares of the stock.

**Problem 2:**

Change in price = Vega \* (New implied volatility – Old implied volatility)

=> Change in price = 0.25 \* (25% - 20%) = 1.25%

Hence, the price of the put option increases by 1.25%.

**Problem 3:**

Time decay loss = Number of options \* Theta \* Time difference (in days)

=> Time decay loss = 50 \* (-0.05) \* 10 = -25

Hence, the price of the option decreases by $25 (assuming other factors remain constant).

**Problem 5:**

1) Delta can be used to construct a delta-neutral portfolio which can hedge the portfolio against delta, so that the position’s value will depend only on the other Greeks such as Theta and Vega. The value of delta also indicates the probability of the option ending up in the money at expiry.

2) The plot of delta vs underlying value is like a sigmoid function, in which the slope is maximum when the underlying value is close to the strike price. The percentage return would be maximum when the ratio of delta : premium will be maximum. This ratio is maximum for slightly OTM options. Also, for slightly OTM options, the increase in delta for a unit increase in the underlying value is greater than the decrease in delta for a unit decrease in the underlying value (rate of change of Gamma is positive in the acceleration phase). Thus, it is considered a good strategy to write slightly OTM options.

3) Options with high Gamma are generally avoided because the delta can change rapidly, which can suddenly change the probability that the option will end up in the money. Since the plot of delta vs underlying value is like a sigmoid function, where the slope is maximum when the underlying value is close to the strike price, ATM options have very high Gamma and deep OTM & ITM options have very low Gamma.

4) Theta increases as the option moves towards expiry. Near the expiry, the value of Theta could be very high which would make it profitable to buy the option and sell it later, because near expiry, the effect of Theta is much greater than that of the other Greeks.

5) Trading a high Vega option is very risky since the option’s price can change rapidly. However, if the trader can understand the cause and effect of the high volatility, such as a significant event, the trader can buy or sell the option based on the directional nature of the event.

6) The changes in interest rates are too small to significantly affect the option’s price. However, Rho values are used when trading options which are very far from expiry.