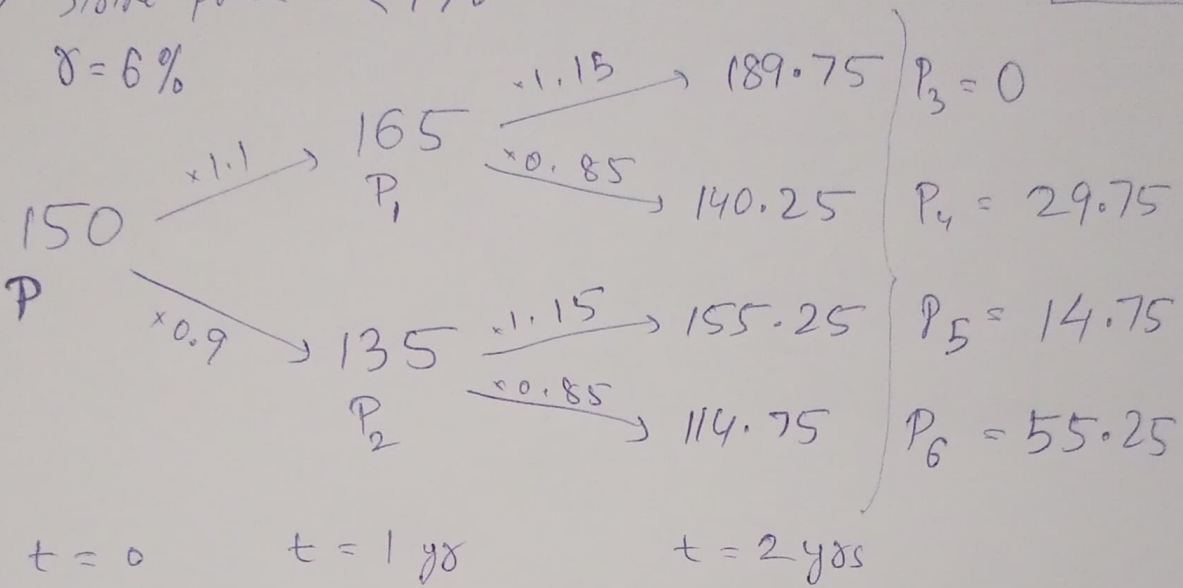
Task - 3

$$q_1 = \frac{e^{\gamma t} - 0.9}{1.1 - 0.9} = 0.809$$

$$q_2 = \frac{e^{\gamma t} - 0.85}{1.15 - 0.85} = 0.706$$

1) Strike price = ₹170

$\gamma = 6\%$



$$P_1 = \max(170 - 165, e^{-\gamma t}(q_2 P_3 + (1 - q_2) P_4))$$

$$P_1 = \max(5, 8.237) = 8.237$$

$$P_2 = \max(170 - 135, e^{-\gamma t}(q_2 P_5 + (1 - q_2) P_6))$$

$$P_2 = \max(35, 25.105) = 35$$

$$P = \max(170 - 150, e^{-\gamma t}(q_1 P_1 + (1 - q_1) P_2))$$

$$P = \max(20, 13.349) = 20$$

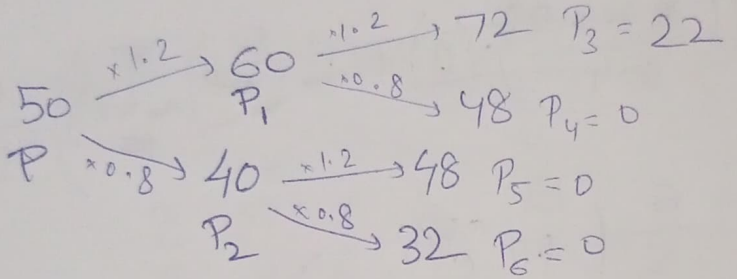
$\Rightarrow$ Premium = ₹ 20

2) Strike price = ₹50, $\gamma = 6\%$

$$q = \frac{e^{\gamma t} - d}{u - d} = \frac{e^{0.06} - 0.8}{1.2 - 0.8} = 0.655$$

⇒ risk-neutral probability of price moving up = 0.655

risk-neutral probability of price moving down = 0.345



$$P_1 = e^{-\gamma t}(qP_3 + (1-q)P_4) = 13.57$$

$$P_2 = e^{-\gamma t}(qP_5 + (1-q)P_6) = 0$$

$$P = e^{-\gamma t}(qP_1 + (1-q)P_2) = 8.37$$