FE-T.

Assignment-1.

1) i) Arbitrage is the simultaneous purchase and sale of the same asset in different markets in order to profit from tiny differences in the assets listed price.

ii) In absence of trade frictions, and under conditions of free competition and price flexibility, identical goods must be sold for the same price.

iii) $S_0 + p = c + Ke^{-rt} + De^{-rt}$

$125 + p = 30 + 120e^{-0.05\times0.25} + 4.6875e^{-0.05\times0.25}$

$p = 28.11$

buy put options and sell call options

4> i> Holder of American Call option gets to earn interest on K for a longer period shall he/she decide to not exercise the option

ii> If he/she decides to exercise they will receive 20 in dividends.

iii> If ~~they~~ he/she does not exercise ~~the~~ they will receive 28.8846 in terms of risk free rate.

5> $\sigma = 35\%$

$S_0 = ₹254$

$r = 16\%$

ii) $q = \dfrac{e^{rt} - D}{U - D}$

$1 - q = \dfrac{U - e^{rt}}{U - D}$

up move $\rightarrow$ $80 \times U$

down move $\rightarrow$ $80 \times D$

8)

$S_0 \to S_0U \ \boxed{C_u}$

$S_0 \to S_0D \ \boxed{C_d}$

$$C_u = \phi S_0 U + \psi e^{r}$$

$$C_d = \phi S_0 D + \psi e^{r}$$

$(-) \quad (-) \quad (-)$

$$C_u - C_d = \phi(S_0U - S_0D)$$

$$\phi = \frac{C_u - C_d}{S_0(U-D)}$$

Sub ϕ in ①.

$$C_u = \frac{C_u - C_d}{S_0(U-D)} S_0 U + \psi e^{r}$$

$$\psi e^{r} = C_u - \frac{UC_u - UC_d}{U-D}$$

$$= \frac{UC_u - DC_u - \cancel{UC_u} + UC_d}{U-D}$$

$$\psi = \frac{UC_d - DC_u}{U-D} e^{-r}$$

$$C_0 = \phi S_0 + \psi$$

$$= \frac{C_u - C_d}{S_0(U-D)} S_0 + e^{-r}\left(\frac{UC_d - DC_u}{U-D}\right).$$

$$= \frac{C_u - C_d + UC_d e^{-r} - DC_u e^{-r}}{U-D}$$

Multiply and divide by e^{r}.

$$= \frac{C_u(1 - De^{-r})}{U-D} + \frac{C_d(Ue^{-r} - 1)}{U-D}$$

$$= e^{-r}\,\overbrace{\frac{C_u(e^{r} - D)}{U-D}}^{q} + \overbrace{\frac{C_d e^{-r}(U - e^{r})}{U-D}}^{1-q}$$

$= e^{-r}[C_u q + C_d(1-q)]$

$E(S_1) = q S_0 U + (1-q) S_0 D$

$= \frac{e^{r} - D}{U-D} S_0 U + \frac{U - e^{r}}{U-D} S_0 D$

$= S_0 \left[\frac{U e^{r} - UD + UD - D e^{r}}{U-D} \right]$

$= S_0 e^{r} \frac{[U-D]}{U-D}$

$= S_0 e^{r}$

Hence proved.

$0.120 + S_0 = 13.34 + 70 e^{-r0.25}$

$0.568 + S_0 = 8.869 + 75 e^{-r0.25}$

$(-) \quad (-) \quad (-) \quad (-)$

$-0.448 = 4.471 - 5 e^{-r0.25}$

$5 e^{-r0.25} = 0.9838$

$-0.25 r = -0.01633$

$r = 6.53306\%$

$S_0 = 84.3726$

$F = S_0 e^{rt}$

$= 85.762017$

$ae^{-rt} + 6.899 = 1.055 + 84.3726$

$a = 86.83$

$\cancel{b}e^{-rt}$

$80e^{-rt} + b = 1.789 + 84.3726$

$b = 7.4575$

$85e^{-rt} + 2.594 = C + 84.3726$

$C = 1.8444$

$\because e^{-r} = e^{-0} = 1$

10) $q = \frac{1-D}{U-D}$

$= \frac{1-\frac{1}{U}}{U-\frac{1}{U}}$

$= \frac{\frac{U-1}{\cancel{U}}}{\frac{U^2-1}{\cancel{U}}}$

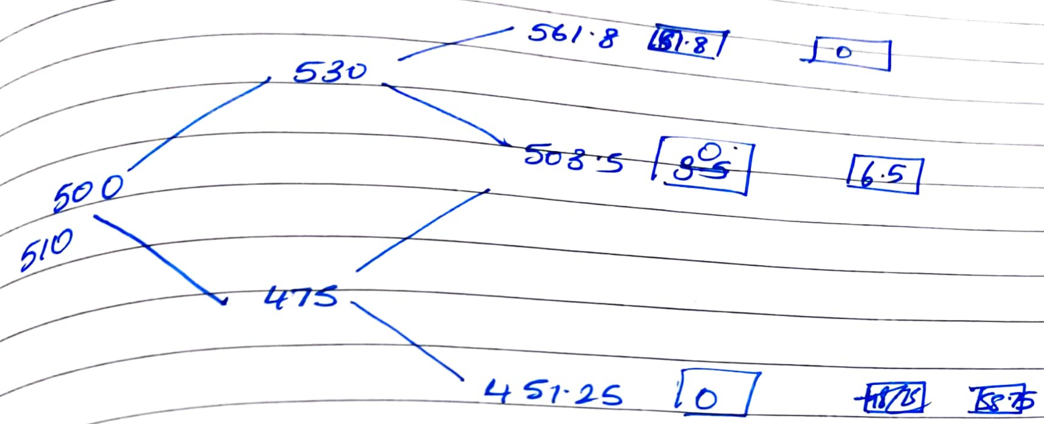
$= \frac{U-1}{(U-1)(U+1)}$

$= \frac{1}{U+1}$

$D < 1 < U$

$\therefore q < 1/2$

→ u & D are constant ~~is~~ throughout the time steps.
→ q is constant.
→ middle values converge
→ ud = du
→ reduced outcomes (N+1) where N is the no of time steps



$Co = 51.8\, q^2 \quad e^{-2r}.$

$= 51.8$

$= 47.6895.$

$Co = 2[6.5(q)(1-q)] + 58.75(1-q)^2.$

$= 0.9498 + 0.8699$

$= 1.8197.$

0.92064.
0.07936.