C= S_t N(d_1) - K e^{-rt} N(d_2)

where;

$$d_1 = \frac{\ln \frac{S}{K} + (r + \frac{\sigma^2}{2})t}{\sigma\sqrt{t}} \quad , \quad d_2 = d_1 - \sigma\sqrt{t}$$

SOLUTION

S= $40

K= $45

t= 4months = 0.33yrs

r =3 %= 0.03

σ =40%= 0.4

$$d_1 = \frac{\ln(\frac{40}{45}) + (0.03 + \frac{0.4^2}{2})0.3333}{4\sqrt{0.3333}}$$

$$\frac{\ln(0.8889) + (0.03 + 0.08)0.3333}{0.23093}$$

$$\frac{-0.11778 + 0.03667}{0.23093}$$

$$\frac{-0.08111}{0.23093}$$

= -0.35123

d_2 = -0.35123 - (0.4) $\sqrt{0.3333}$

-0.35123 - 0.13333

-0.58217

Therefore approximating the D values to 2 decimal places

d_1 = -0.35 , d_2 = -0.58

Using the standard normal distribution table

N(d_1)=0.3632 , N(d_2)=0.2810

Black-Scholes Call price ,C =40(0.3632) -45($e^{-0.03(\frac{1}{3})}$)(0.2810)

C= 14.528 – 12.519

C= $2.009