# J.K. SHAH TEST SERIES

## Evaluate Learn Succeed

## SUGGESTED SOLUTION

### CA FINAL NOV'19

#### SUBJECT- SFM

## Test Code – FNJ 7213

#### BRANCH - () (Date :)

## ANSWER-1

## ANSWER-A

1. **(i)** **3 Months Interest rate is 4.50% & 6 Months Interest rate is 5% p.a.**

Future Value 6 Months from now is a product of Future Value 3 Months now & 3 Months

Future Value from after 3 Months.

$(1+0.05*6/12) = (1+0.045*3/12) \times (1+i_{3,6}*3/12)$

$i_{3,6} = [(1+0.05* 6/12)/(1+0.045*3/12) - 1]*12/3$

i.e. 5.44% p.a.

**(ii)** To find arbitrage opportunity first we shall find out the 6 Months forward 6 month rate as follows:

$(1+0.065) = (1+0.05*6/12) \times (1+i_{6,6}*6/12)$

$i_{6,6} = [(1+0.065/1.025) - 1]*12/6$

6 Months forward 6 month rate is 7.80% p.a.

The Bank is quoting 6/12 USD FRA at 6.50 – 6.75%

Therefore, there is an arbitrage Opportunity of earning interest @ 7.80% p.a. & Paying

@ 6.75%

**Strategy:** Borrow for 6 months, buy an FRA & invest for 12 months

To get $ 1.065 at the end of 12 months for $ 1 invested today

To pay$ 1.060# at the end of 12 months for every $ 1 Borrowed today

Net gain $ 0.005 i.e. risk less profit for every $ borrowed

# (1+0.05/2) (1+.0675/2) = (1.05959) say 1.060

**(5 MARKS)**

## ANSWER-B

**No. of the Future Contract to be obtained to get a complete hedge**

$$= \frac{10000 \times 22 \times 1.5 - 5000 \times Rs.40 \times 2}{Rs..1000}$$

$$= \frac{Rs.3,30,000 - Rs.4,00,000}{Rs.1000} = 70 \text{ contracts}$$

Thus, by purchasing 70 Nifty future contracts to be long to obtain a complete hedge.

**Cash Outlay**

= 10000 x Rs. 22 – 5000 x Rs. 40 + 70 x Rs. 1,000

= Rs. 2,20,000 – Rs. 2,00,000 + Rs. 70,000 = Rs. 90,000

**Cash Inflow at Close Out**

= 10000 x Rs. 22 x 0.98 – 5000 x Rs. 40 x 1.03 + 70 x Rs. 1,000 x 0.985

= Rs. 2,15,600 – Rs. 2,06,000 + Rs. 68,950 = Rs. 78,550

**Gain/ Loss**

= Rs. 78,550 – Rs. 90,000 = - Rs. 11,450 (Loss)

**(5 MARKS)**

# ANSWER-2

## ANSWER-A

Instead of selling the stock of Reliance Ltd., Ram must cover his Risk by buying or long position in Put Option with appropriate strike price. Since Ram's risk appetite is 5%, the most suitable strike price in Put Option shall be Rs. 950 (Rs. 1000 – 5% of Rs. 1000). If Ram does so, the overall position will be as follows:

| Spot Price after 1 month | Stock Value | Put Payoff | Initial Cash Flow | Total |
|---|---|---|---|---|
| S < 950 | S | 950 – S | -8 | 942 - S |
| S > 950 | S | - | -8 | S – 8 |

Thus, from the above, it can be seen that the value of holding of Ram shall never be less than Rs. 942 as Put Option will compensate for loss below spot price of Rs. 950. However, this strategy will involve a cost of Rs. 8.

**Alternative View:**

Since Ram is investing Rs. 1000 and he can afford loss of maximum Rs.50 (Rs.1000 x 5%), He can also buy a put with exercise price of Rs.970 and pay the premium of Rs.20.

So in this case if spot price goes down below Rs.970 on exercise date, Ram can sale the share @ 970. So his loss on share will be (buy @1000 and sell @970) Rs.30 and he has paid put premium of Rs.20.
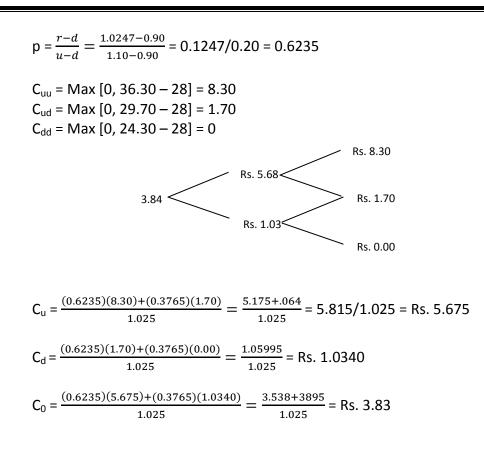
Therefore, total outflow of Mr. Ram will be = Rs.30 + Rs.20 = Rs.50.

**(5 MARKS)**

## ANSWER-B

u = 33.00/30.00 = 36.30/33.00 = 1.10        d = 27.00/30.00 = 24.30/27.00 = 0.90

$r = (1 + .05)^{1/2} = 1.0247$

$p = \dfrac{r-d}{u-d} = \dfrac{1.0247-0.90}{1.10-0.90} = 0.1247/0.20 = 0.6235$

$C_{uu}$ = Max [0, 36.30 − 28] = 8.30
$C_{ud}$ = Max [0, 29.70 − 28] = 1.70
$C_{dd}$ = Max [0, 24.30 − 28] = 0



$C_u = \dfrac{(0.6235)(8.30)+(0.3765)(1.70)}{1.025} = \dfrac{5.175+.064}{1.025} = 5.815/1.025 = $ Rs. 5.675

$C_d = \dfrac{(0.6235)(1.70)+(0.3765)(0.00)}{1.025} = \dfrac{1.05995}{1.025} = $ Rs. 1.0340

$C_0 = \dfrac{(0.6235)(5.675)+(0.3765)(1.0340)}{1.025} = \dfrac{3.538+3895}{1.025} = $ Rs. 3.83

**(5 MARKS)**

## ANSWER-3

(i)     Given: TIC Ltd. Current Price = Rs. 415

Exercise rate = 400

Risk free interest rate is = 5% p.a.

SD (Volatility) = 22%

Based on the above bit is calculated value of an option based on Block Scholes Model:

$$1 = \dfrac{I_n\left(\dfrac{415}{400}\right)+\left[.05+\dfrac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \dfrac{.03681+.01855}{.11} = .5032727$$

$$d_2 = \dfrac{I_n\left(\dfrac{415}{400}\right)+\left[.05-\dfrac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \dfrac{.03681+.00645}{.11} = .3932727$$

N($d_1$) = N (.50327) = 1 - .3072 = .6928

N($d_2$) = N (.39327) = 1 - .3471 = .6529

Value of Option     $= 415\,(.6928) - \dfrac{400}{e^{(.05)(.25)}}(.6529)$

$= 287.512 - \dfrac{400}{1.012578}(.6529) = 287.512 - 257.916 = Rs.29.60$

NB : N(0.39327) can also be find as under :

Step 1 : From table of area under normal curve find the area of variable 0.39 i.e. 0.6517.

Step 2 : From table of area under normal curve find the area of variable 0.40.

Step 3 : Find out the difference between above two variables and areas under normal curve.

Step 4 : Using interpolation method find out the value of 0.00327. Which is as follows:

$$\frac{0.0037}{0.01} \times 0.00327 = 0.0012$$

Step 5 : Add this value, computed above to the N(0.39).

Thus N (0.39327) = 0.6517 + 0.0012 = 0.6529

Since market price of Rs. 25 is less than Rs. 29.60 (Block Scholes Valuation model) indicate that option is underpriced, hence worth buying.

**(3.5 MARKS)**

(ii)   If the current price is taken as Rs. 380 the computations are as follows:

$$d_1 = \frac{I_n\left(\frac{380}{400}\right) + \left[.05 + \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-0.05129 + .01855}{.11} = -0.297636$$

$$d_2 = \frac{I_n\left(\frac{380}{400}\right) + \left[.05 - \frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-0.05129 + .00645}{.11} = -0.407666$$

$$V_o = V_s N(d_1) - \frac{E}{e^n} N(d_2)$$

N(d$_1$) = N(-0.297636) = .3830

N(d$_2$) = N(-0.407666) = .3418

$$380\,(.3830) - \frac{400}{e.^{(.05)(.25)}} \times (.3418)$$

$$145.54 - \frac{400}{1.012578}(.3418) = 145.54 - 135.02 = 10.52$$

**(3 MARKS)**

(iii)   Value of call option = Rs. 7.10

Current Market Value = Rs. 415

Present Value of Exercise Price = $\frac{400}{1.0125} = 395.06$

$$V_p = -V_s + V_s + PV(E)$$

$$V_p = -380 + 7.10 + 395.06 = 22.16 = \text{Rs. } 22.16 \text{ Ans}$$

(iv) Since dividend is expected to be paid in two months time we have to adjust the share price and then use Block Scholes model to value the option:

Present Value of Dividend (using continuous discounting) = Dividend $\times e^{-rt}$

$= Rs. 10 \times e^{-.05 \times .1666}$

$= Rs. 10 \times e^{-.008333}$

= Rs. 9.917 (Please refer Exponential Table)

Adjusted price of shares is Rs. 408 – 9.917 = Rs. 398.083

This can be used in Block Scholes model

$$d_1 = \frac{I_n\left(\frac{398.083}{400}\right)+\left[.05+\frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-.00480+.01855}{.11} = .125$$

$$d_2 = \frac{I_n\left(\frac{398.083}{400}\right)+\left[.05-\frac{1}{2}(.22)^2\right].25}{.22\sqrt{.25}} = \frac{-.00480+.00645}{11} = 0.15$$

$N(d_1) = N(.125) = .5498$

$N(d_2) = N(.015) = .5060$

Value of Option 398.0 83 (.5498) - $\dfrac{400}{e^{(.05)(.25)}}(.5060)$

218.866 - $\dfrac{400}{e^{.0125}}(.5060)$

218.866 - $\dfrac{400}{1.012578}(.5060) = 218.866 - 199.8858 = Rs. 18.98$

**(2 MARKS)**

## ANSWER-4

## ANSWER-A

**(i)** TM will make a profit of 25 basis points since a 6X9 FRA is a contract on 3 -month interest rate in 6 months, which turns out to be 5.50% (higher than FRA price).

**(ii)** The settlement amount shall be calculated by using the following formula:

$$\frac{N(RR-FR)(\frac{dtm}{360})}{1+RR(\frac{dtm}{360})}$$

Where

N　　　=　　　Notional Principal Amount

RR      =      Reference Rate

FR      =      Agreed upon Forward Rate

Dtm  =      FRA period specified in days.

Accordingly:

$$\frac{100\ crore\ (5.50\% - 5.25\%)(92*/360)}{1 + 0.055(92*/360)} = Rs.\ 6.30.032$$

Hence there is profit of Rs. 6,30,032 to TM Fincorp.

\* Alternatively, it can also be taken as 90 days.

**(8 MARKS)**

## ANSWER-B

| Date | 1 Sensex | 2 EMA for Previous day | 3 1-2 | 4 3×0.062 | 5 EMA 2 + 4 |
|------|----------|------------------------|-------|-----------|-------------|
| 6  | 29522 | 30000     | (478)    | (29.636) | **29970.364** |
| 7  | 29925 | 29970.364 | (45.364) | (2.812)  | **29967.55**  |
| 10 | 30222 | 29967.55  | 254.45   | 15.776   | **29983.32**  |
| 11 | 31000 | 29983.32  | 1016.68  | 63.034   | **30046.354** |
| 12 | 31400 | 30046.354 | 1353.646 | 83.926   | **30130.28**  |
| 13 | 32000 | 30130.28  | 1869.72  | 115.922  | **30246.202** |
| 17 | 33000 | 30246.202 | 2753.798 | 170.735  | **30416.937** |

**Conclusion** – The market is bullish. The market is likely to remain bullish for short term to medium term if other factors remain the same. On the basis of this indicator (EMA) the investors/brokers can take long position.

**(4 MARKS)**

## ANSWER-5

Maximum decline in one month = $\frac{5326 - 4793.40}{5326} \times 100 = 10\%$

(1)  Immediately to start with

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (3,00,000 – 2,70,000) = Rs. 60,000

Indira may invest Rs. 60,000 in equity and balance in risk free securities.

(2)  After 10 days

| Value of equity = 60,000 x 5122.96/5326 | = | Rs. 57,713 |
|---|---|---|
| Value of risk free investment | = | Rs. 2,40,000 |
| Total value of portfolio | = | Rs. 2,97,713 |

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (2,97,713 – 2,70,000) = Rs. 55,426

Revised Portfolio:

| Equity | = | Rs. 55,426 |
|---|---|---|
| Risk free Securities = Rs. 2,97,713 – Rs. 55,426 | = | 2,42,287 |

(3) After another 10 days

| Value of equity = 55,426 x 5539.04/5122.96 | = | Rs. 59,928 |
|---|---|---|
| Value of risk free investment | = | Rs. 2,42,287 |
| Total value of portfolio | = | Rs. 3,02,215 |

Investment in equity = Multiplier x (Portfolio value – Floor value)

= 2 (3,02,215 – 2,70,000)  = Rs.      64,430

Revised Portfolio:

Equity                                          =    Rs. 64,430

Risk Free Securities = Rs. 3,02,215 –  Rs. 64,430 =    Rs. 2,37,785

The investor should off-load Rs. 4502 of risk free securities and divert to Equity.

**(8 MARKS)**