Scheme of Evaluation (1)

CMR INSTITUTE OF TECHNOLOGY	USN											CMRIT

Internal Assesment Test - II

Sub:	Financial Derivatives						Code:	20MBAFM402
Date:	11.07.2022	Duration:	90 mins	Max Marks:	50	Sem: IV	Branch:	MBA

Part A - Answer Any Two Full Questions (2* 20 = 40 marks)		Marks	OBE CO	OBE RBT
1 (a)	Differentiate between maintenance margin and variation margin.	[03]	CO1	L2
(b)	Grade 1 wheat is traded in the market for Rs.1,600 per quintal, a 6 month. Futures contract on this wheat traded at Rs.1,675. The size of one future contract is 1 quintal. An amount of Rs.25 has to be paid storing 1 quintal wheat for 6 months. The risk-free rate of interest continuously compounded is 8% p.a. i. Is there any arbitrage opportunity here? ii. If so, design an arbitrage and state how much profit can be made from this?	[07]	CO1	L3
(c)	Using the following data prepare a margin a/c for the investor. Assume that if a margin call is made at a time and the investor takes short position, one contract size is 500 units, unit price is 22, number of contracts is 8, Initial margin = 12%, Maintenance margin = 3/4th of initial margin. The date of contract is 3/6/2020. Price on the following data.	[10]	CO1	L3

Day	June 4	June 5	June 6	June 7	June 10	June 11	June 12
Price	22.30	23.10	22.90	23.00	23.15	22.85	22.95

		Marks	CO	RBT
2 (a)	Who is a Hedger?	[03]	CO2	L1
(b)	Briefly explain futures and options.	[07]	CO1	L2
(c)	A portfolio manager owns three securities as detailed below:	[10]	CO1	L3

Security	No. of Shares	Price per Share (Rs.)	Beta
A	15,000	40	1.2
B	25,000	20	1.8
C	15,000	60	0.8

Find beta value for this portfolio.

		Marks	CO	RBT
3 (a)	Define arbitrage.	[03]	CO2	L1
(b)	Bring out the difference between futures and options.	[07]	CO2	L2
(c)	An investor bought 10 T-bills future contract trading on IMM at Rs.96.72. The initial margin requirement is Rs.2,000 per contract with maintenance margin of Rs.1,500 per contract. The settlement price of T-bills future contract for 9 trading days are as follows:	[10]	CO1	L4

Day	1	2	3	4	5	6	7	8	9
Price	96.75	96.68	96.63	96.59	96.54	96.50	96.55	96.60	96.64

The investor closes his position when future price was 96.67. Show the margin account balance and the gains from future contract. Size of a contract is 2,500.

Part B - Compulsory (01*10=10 marks)

4	1) An investor Mr. Kairav has constructed a portfolio on 1st May 2020 consisting shares of ten companies; the details of which are given below:	[10]	CO2	L4

Sl. No	Stock	Market Price	No. of Shares (Rs.)	Beta Value (Rs.)
1	Apollo Tyres Ltd.	250	1,000	0.93
2	Arvind Ltd.	370	950	0.69
3	Bata India Ltd.	580	750	0.75
4	Ajanta Pharma Ltd.	1,460	400	0.55
5	Biocon Ltd.	400	650	0.45
6	Exide Industries Ltd.	217	900	1.07
7	Federal Bank Ltd.	117	1,500	1.28
8	IDFC Ltd.	58	3,000	0.81
9	Voltas Ltd.	500	500	1.52
10	SRF Ltd.	1,511	300	1.99

The continuous compounding, annual cost of capital for the investor is 15%. The investor fears that the market will fall in the near future due to occurrence of war between China and India and hence wants to hedge the portfolio without selling the shares in the portfolio. Since the investor is not aware of the hedging strategies available, you, being the financial analyst, are requested to explain the investor various options available to hedge the portfolio and choose the best one. You are also required to:

a) Calculate the theoretical value of the futures contracts expiring in July and August 2020 if the Nifty is currently quoted at 9,500.

b) Find whether or not the futures market and spot market price are consistent so as not to offer an arbitrage profit if July and August futures are currently trading at 9,700 and 10,000 with lot size of 75.

c) Find out the numbers of Nifty futures contracts required to be shorted to hedge the entire portfolio of the investor until July and August 2020.

d) Find out the number of Nifty futures contracts required to be shorted to hedge to the extent of 90% and 125%% of the portfolio until August 2020.

e) Find out the numbers of Nifty futures contracts required to be traded if the investor descries to reduce beta of his portfolio to 0.80

Course Outcomes (COs)		PO1	PO2	PO3	PO4	PO5
CO1:	Understand the mechanism of forwards/futures, options, financial swaps, various credit derivatives and VaR with their features, merits and demerits.	1a, 1b, 1c, 2b, 2c, 3c				
CO2:	Assess the application of forwards/futures, options, financial	2a, 3a, 3b,				

CMR INSTITUTE OF TECHNOLOGY

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Scheme of Evaluation
Internal Assessment Test II– July 2022

<table>
<tr><td>Sub:</td><td colspan="7">Financial Derivatives</td><td>Code:</td><td>20MBAFM402</td></tr>
<tr><td>Date:</td><td>11/07/22</td><td>Duration:</td><td>90mins</td><td>Max Marks:</td><td>50</td><td>Sem:</td><td>IV</td><td>Branch:</td><td>MBA</td></tr>
</table>

Note: Part A - Answer Any Two Full Questions (20*02=40 Marks)
Part B - Compulsory (01*10= 10marks)

<table>
<tr><th>Part</th><th colspan="2">Question #</th><th>Description</th><th>Marks Distribution</th><th>Marks</th></tr>
<tr><td rowspan="3">A</td><td rowspan="3">1</td><td>a)</td><td>Maintenance margin is the minimum amount a future trader required to maintain his margin a/c in order to hold his future options.
Variation margin is unrealised profit or loss on open positions</td><td>3</td><td rowspan="3">20M</td></tr>
<tr><td>b)</td><td>$S_0 = 1600$, $F = 1675$, $c = r_f = 0.08$, $t = 6/12$

$F = (S_0 + E)\, e^{rt}$
$E = S \cdot e^{-rt} = 25 \cdot e^{-(0.08)(0.5)}$
$E = 24.019$

$S_0 = \underline{1690.28}$

<u>Arbitrage possibility</u>:
$F = 1675 < S_0 = 1690.28$ = Profit = $S_0 e^{rt} - F$
Profit $= 1690.28 - 1675 = \underline{15.28}$
→ long position in future and short position shares</td><td>7</td></tr>
<tr><td>c)</td><td>IM = 88000 × 12% = 10560, contract value = 500×22×8 = <u>88000</u>

MM = 3/4th of 10560 = 7920

<u>Position short (4-T)</u>
<table><tr><th>Day</th><th>Price</th><th>C/P</th><th>Margin A/c</th><th>margin call</th></tr><tr><td>4</td><td>22.30</td><td>(1200)</td><td>9360</td><td></td></tr><tr><td>5</td><td>23.10</td><td>(3200)</td><td>6160</td><td>→ $\boxed{4400}$ ~~5th~~</td></tr><tr><td>6</td><td>22.90</td><td>800</td><td>11,360</td><td></td></tr><tr><td>7</td><td>23.00</td><td>(400)</td><td>10,960</td><td></td></tr><tr><td>10</td><td>23.15</td><td>(600)</td><td>10,360</td><td></td></tr><tr><td>11</td><td>22.85</td><td>1200</td><td>11560</td><td></td></tr><tr><td>12</td><td>22.95</td><td>(400)</td><td>11160</td><td></td></tr></table></td><td>10</td></tr>
</table>

2

a) Hedger look at reducing his asset exposure to price volatility and in a derivative market. — **3**

b) <u>Futures</u> : contract to buy or sell an o underlying assets at a pre-determined price on a specific date.

<u>Options</u> : It gives an opportunity to the investor the right but not the obligation to buy or sell the assets at a specific price on a specific date, known as the expiry date. — **7**

c) Calc. of Portfolio Beta (β_p) — **10**

Security	No. of share	price	Market value	Wi	β	Bp
A	15000	40	600,000	0.3	1.2	0.36
B	25000	20	500,000	0.25	1.8	0.45
C	15000	60	900,000	0.45	0.8	0.36
			2000,000			1.17

$\beta p = 1.17$

20M

3

a) When an investor ~~he~~ can make a profit from simultaneously buying and selling a commodity in two different markets. — **3**

b) — **7**

<u>Futures</u>	<u>Options</u>
• Exchange traded	• Same as future
• Exchange defines the price	• Same as futures
• Price is zero	• Strike price is fixed, price moves
• Linear payoff	• Price is always positive

20M

c)

Day	Price	P/L	Margin A/c Bal	M. Call
1	96.75	750	20750	
2	96.68	(1750)	19000	
3	96.63	(1250)	17750	
4	96.59	(1000)	16750	
5	96.54	(1250)	15500	
6	96.50	(1000)	14500 →	5500
7	96.55	1250	21500	
8	96.60	1250	22500	
9	96.64	1000	23500	

Margin Call on 6th day

10

B 4 a)

$\beta p = 0.97$

(a) $F = S_0 . e^{rt} = 9500 . e^{0.30 \times 0.15}$

$F = 9997.06$

(b) For July

$F = S_0 . e^{rt}$

$= 9700 . e^{0.15 \times 0.25} = 10070.65$

Total $= 10070.65 \times 75 = 755,299.2$

(c) Aug = $F = 10000 . e^{(0.34 \times 0.15)} = 10523.22$

Total $= 10523.22 \times 75 = 789,242.17$

(c) Hedge $= \frac{P \times \beta}{F} = 31,28,600 \times 0.97 / 9700 \times 75$

$= 30,34,742 / \cancel{727}500 = 4.1 \simeq$ 4 contracts

No. of contracts hedge for $0.96 \beta = 4.01$

(d) 90% of P. = 3.6 contracts | 125% = 5.05 contracts

(e) Reduce β to 0.08 = 0.709 ≃ 1 contracts

10 10M