



**National University of  
Science and Technology**  
*Think in Other Terms*



**FACULTY OF COMMERCE**

**DEPARTMENT OF FINANCE**

**BACHELOR OF COMMERCE HONORS DEGREE IN FINANCE**

**FINANCIAL ENGINEERING CFI 4106**

**TIME: 3 HOURS**

**SUPPLEMENTARY EXAMINATIONS**

**JULY 2014**

**Instructions**

- **Answer any FOUR questions**
  - **Each question carries 25 marks**
  - **Where necessary ,show workings for question 1**
  - **The paper consists of seven printed pages**
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**Question 1**

(i) A Trader takes a long position in a Eurodollar futures contract with face value of \$1million at 98.14 and closes it out at 98.27. The trader has:

- A. Lost \$325
- B. Gained \$325
- C. Lost \$1300
- D. Gained \$1300

**(3marks)**

(ii). Stock selling at \$40, 3 month put at \$50 selling for \$11 and 3 month call at \$50 selling for \$1, risk free rate at 6%. How much, if anything can be made from through arbitrage?

- A. No arbitrage
- B.\$0.28
- C.\$0.72
- D.\$2.83

**(4marks)**

(iii). A decrease in the market rate of interest will;

- A. Increase put and call prices
- B. decrease put and call prices.
- C. Decrease put prices and increase call prices
- D. Increase put prices and decrease call prices

**(2marks)**

(iv). A forward rate agreement is equivalent to the following interest rate options;

- A.Long a call and a put
- B. Short a put and a call

C.Short a call and long a put

D.Long a call and short a put

**(2marks)**

(v). Consider a \$2m Forward Rate Agreement with a contract rate of 5% on a 60 day LIBOR. If 60 day LIBOR is 6% at maturity, the long will

A. pay \$3,300

B.pay \$3,333

C.receive \$3,300

D. pay \$3,333

**(3marks)**

(vi). Party A has entered into a forward contract to purchase P10 million at an exchange rate of \$0.98 per peso. At settlement , the exchange rate is \$0.97 per peso. If the contract is settled in cash, Party A will;

A. make a payment of \$100,000

B. receive \$100,000

C. make a payment of \$103,000

D. receive \$103,000

**(3marks)**

(vii). A company treasurer needs to borrow \$10m for 180 days ,60 days from now. The type of FRA and position the treasurer should take to hedge interest rate risk are;

A. 2 against 6 long

B.2 against 6 short

C.2 against 8 long

D. 2 against 8 short

**(2marks)**

(viii). The short in a deliverable forward contract;

A. has no default risk

B. receives a payment at contract initiation

C. is obligated to deliver a specified asset

D. makes a cash payment to the long.

(2marks)

(ix). *In a covered call , the investor ;*

A. is long on a call and asset

B. long on call and short in an asset

C. short in a call and long in an asset

D. short asset and short in a call

(2marks)

(x). *In a Bear Call spread;*

A. sell a call with lower strike and buy a call with higher strike price

B. sell a call with higher strike price and buy a call with lower strike price

C. sell a call with lower strike and buy a put with higher strike price

D. sell a call with higher strike and buy a put with lower strike price

(2marks)

## Question 2

(a) Given a market without arbitrage opportunities between Put options and Call options, using relevant arguments, show that for European options;

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$$C + Ke^{-rt} = P + S_0$$

Where;

C =Call price

P=Put price

$K$ =Exercise price

$S_0$ = Spot price

$r$ = risk free rate of return

$t$ = time to maturity for both put and call options

**(10marks)**

- (b) Given that Call option and Put option premiums are at \$4 and \$3 respectively. The spot price of an underlying asset is \$50 while the exercise price on both put options and call options contracts of 0.25 years to maturity is \$60 .
- (i) Evaluate the relationship between two possible portfolios that can be derived from information given. **(6marks)**
- (ii) What strategy will a rational investor undertake to maximize returns **(4marks)**
- (c) Explain basis risk as it apply to Futures contracts. **(5marks)**

### Question 3

- (a) The current spot price of an AICO Limited share is \$2694, a call option at a strike price \$2600 will attract a premium of \$154 while a call option with a strike price of \$2800 will attract a premium of \$49.
- (i) Show that a Bear Call spread strategy based on information given above will, result in a maximum profit of \$105 and a maximum loss of \$95. Your answer should be accompanied by a pay off diagram. **(6marks)**
- (b) Mr Nicholson is considering expanding his timber production line. The upgrading of the production house will take 3 months to complete. Raw timber prices are likely to increase between now and 3 months time. There is no storage space, Mr Nicholson cannot therefore buy the raw material now for future use. A forward contract is used by Mr Nicholson to hedge the price risk. The current spot price per tonne of timber is \$108 and the risk free rate is 5%.
- (i) What forward price is Mr Nicholson expected to contract at if he has to buy the timber as soon as upgrading of production house is complete. **(4marks)**

- (ii) Evaluate arbitrage opportunities which will emanate if the actual forward price is \$130. **(4marks)**

(c) Air Zimbabwe expects a boom in the number of flights in two months and its projections are that it will need to buy two million gallons of Jet A1 fuel in a months time. To hedge this exposure, it decides to use Heating oil futures. The following data pertains to Jet A fuel prices and the prices of futures on Jet A1 fuel.

- Correlation coefficient between spot price and futures price = 0.928
- Standard Deviation of spot prices 0.0263
- Standard deviation of futures prices 0.0313

- (i) Calculate the Minimum variance hedge ratio. **(6marks)**

- (ii) If the size of each futures contract is 42000, find the optimal number of contracts to be used to hedge the exposure **(5marks)**

#### **Question 4**

(a) Eston Supplies Ltd, a Zimbabwean based company is considering borrowing ZAR 50 million from South Africa, at a fixed rate of interest for five years. The company is not well known in South Africa. The borrowing therefore proves to be difficult. When borrowing from Zimbabwean markets, Eston Supplies is likely to pay a rate of 12% p.a. Genetics Unlimited, a South African based company is considering borrowing an equivalent of ZAR50 million dollars from the Zimbabwean market for five years also at a fixed rate. Five year government bonds in Zimbabwe and South Africa are currently paying 10.5% and 9.5% respectively. The exchange rate between the South African rand and Zimbabwean dollar is \$7/rand and is expected to remain unchanged over the 5 year period.

- (i) Suggest an appropriate SWAP which the two companies may consider. Assume that there is no intermediary involved. **(11marks)**

(b) ABC limited buys, from ZDB Bank, a 3 -against-9 month Forward Rate Agreement (FRA) at a contract rate of 6.25%. The benchmark rate / settlement reference rate is Treasury bill rate. At settlement date, the benchmark rate is 9%. Assuming a notional amount of \$100, 000, show the cashflows at maturity. **(6marks)**

- (c) Explain the basic mechanics in a Credit Default SWAP. How do these instruments differ from Collateralized Debt Obligations? **(8marks)**

**Question 5**

- (a) Engine Wire Limited and Iminent Faces Corporation are United States based companies both considering to borrow funds for capital expenditure. Engine Wire is AAA rated company which can borrow from fixed rate markets at 10% and from floating rate markets at MLR + 0.3%. Iminent faces Corporation, a BBB rated company can borrow at 12.5% and MLR+0.75% from fixed rate markets and floating rate markets respectively.
- (i) As a Financial Director in Iminent Faces corporation, convince your counterpart in Engine Wire Pvt Ltd that there is an opportunity that the two companies can exploit. **(4marks)**
- (ii) Show the possible SWAP transaction between the two companies, assuming that an intermediary bank will be involved and will charge a commission of 0.4% which the two companies involved will share in a 35% and 65% proportion for Engine Wire and Iminent Faces respectively. **(10marks)**
- (iii) Calculate the value of the SWAP to Engine Wire Ltd assuming a notional amount of USD\$1 million. **(5marks)**
- (b) What risks are associated with SWAP transactions? **(6marks)**

**End of paper**