

Name:
Enrolment No:



UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES
Online End Semester Examination, December 2020

Course: Energy Derivatives and Risk Management II
Program: MBA (Energy Trading)
Course Code: OGET 8003

Semester: III
Time: 3 Hours
Max. Marks: 100

SECTION A

1. Each Question will carry 5 Marks
2. Instruction: Explain each briefly in not more than 5 lines

S.No	Question	COs
Q1	Rho in Option Greeks	4
Q2	Limitations of Black Scholes model.	2
Q3	Quality Spread Differential	3
Q4	Stress Testing	4
Q5	Explain the difference between the Implied and Historical volatility	3
Q6	Vega in Option Greeks	4

Section B

1. Each question will carry 10 marks
2. Instruction: Write short / brief notes

Q7	Illustrate the concept of currency swaps with the help of an example.	CO 3
Q8	Explain when does an opportunity of Arbitrage occur at the time of calculation of option premium? Explain the concept of replicating portfolio while applying Binomial model	CO 2
Q9	Consider a case of Interest rate swaps involving two companies Company A and Company B which requires 5 million dollars to expand its operations. Co. A's main aim is to take loan at variable rate of interest and Co. B wants loan at fixed rate of interest. Co. A visits Bank A which is ready to provide loan at LIBOR and a fixed rate of 7%. Co. B visits Bank B which is ready to provide loan at LIBOR+1% and at a fixed rate of 10%. Now a swap bank approaches the two companies asking Co. A & B to take loan from Bank A & Bank B at a fixed and variable rate of interest respectively. Swap Bank entered into a swap contract with Co. A wherein Co. A has to pay \$5 million at LIBOR to the swap bank and in return would receive the amount at 8% fixed	CO 3

rate of interest from the swap bank.
 Similarly Swap bank entered into a swap contract with Co. B wherein Co. B has to pay \$5 million at 8.5% fixed rate of interest to the swap bank and in return would receive the amount at LIBOR from the swap bank.
 Analyze the situation above and answer the following questions:
 1.) How is the swap contract beneficial to Company A?
 2.) How is the swap contract beneficial to Company B?
 3.) Explain the role of swap bank in the whole transaction and the profit earned by it?

Q10 Value at risk (VAR) is a probabilistic measure of the range of values a firm's portfolio could lose due to market volatility. What are the various methods of calculating VAR for a simple portfolio?
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Q11 Calculate annualized Historical Volatility of the soy bean futures prices over a 10 day period. Given the following details: **(10 marks)**

Trading Day	Closing price (in dollars)	Price ratio	Log of ratio
1	19.81		
2	19.77	0.998	-0.002
3	19.41	0.982	-0.018
4	19.26	0.992	-0.008
5	18.69	0.970	-0.030
6	18.69	1.000	0.000
7	18.78	1.005	0.005
8	18.89	1.006	0.006
9	18.9	1.001	0.001
10	19.14	1.013	0.013

Section C

1. Each Question carries 20 Marks.

2. Instruction: Write long answer.

Q12																		
	<p>Calculate the value of a European call option by illustrating stock and options lattice for a period of 4 years with the following details.</p> <table border="1"><thead><tr><th colspan="2">Lattice Parameters</th></tr></thead><tbody><tr><td>Initial Price</td><td>100</td></tr><tr><td>Strike Price</td><td>110</td></tr><tr><td>R</td><td>1.05</td></tr><tr><td>U</td><td>1.08</td></tr><tr><td>D</td><td>0.93</td></tr><tr><td>Q</td><td>80.53%</td></tr><tr><td>1-q</td><td>19.47%</td></tr></tbody></table>	Lattice Parameters		Initial Price	100	Strike Price	110	R	1.05	U	1.08	D	0.93	Q	80.53%	1-q	19.47%	CO 2
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