SET I

Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Energy Trading – I (Oil & Gas Markets) OGET 7003
Semester: II
Programme: MBA (Energy Trading)
Time: 03 hrs. **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q 1	**Explain the following in not more than 2 lines** 1.) Role of Speculator 2.) City gas price 3.) PADD II 4.) Net back price 5.) ASCI 6.) Gas to gas competition 7.) WTI – Brent spread 8.) LNG pricing with S-curve 9.) JCC 10.) Role of Head and Shoulders in Technical Analysis	**20**	**CO 1,2,3,4**

SECTION B

Q 1.	Differentiate between the following: a.) Well head and Hub price b.) WTI Posting-Plus (P-Plus) pricing and NYMEX CMA pricing.	**5**	**CO 1,2**
Q 2.	Describe potential short, medium and long-term supply-side and demand-side drivers for natural gas prices.	**5**	**CO 2**
Q 3.	Understand the logistical challenges that can impact the effectiveness of WTI as a global crude oil benchmark.	**5**	**CO 1**
Q 4.	Explain the mechanics and specifications of the 21-day BFOE (Forward Brent), the Brent Futures, the Exchange for Physical (EFP) and the Dated Brent/BFOE contracts	**5**	**CO 1**

SECTION-C

Q 1.	Compare and contrast the Brent, WTI, and Dubai-Oman crude oil benchmarks in terms of liquidity, price transparency, and available financial products	**15**	**CO 1,3**

Q 2.	Compare and contrast the three main types of market-based gas pricing mechanisms, explaining the main benefit of each; describe the methods used to establish a price through government regulation.	**15**	**CO 3**
SECTION-D			
Q1.	**Refer to the case given below and answer the following questions:** 1. Do you believe news has an impact in the market, explain with the help of an example 2. As a trader, how much weightage you will give to this factor and why? 3. Elaborate with an example, "Buy the rumor, Sell the News". **<u>The Function of News</u>** It is a truism that money makes the market go, but it is less glaringly obvious that smart money tends to move relatively early in a move of any duration. Smarts begin on the trading floor and among the professionals making the market. They can see when orders are starting to dry up and when the immediate surge may be ending. Then they load up so as to be in position when the inevitable rebound gets under way. Professional market-makers tend to be on the right side most of the time, and they tend most especially to be on the right side of the market before a market moving announcement. Often you can tell beforehand from technical action which way money is moving prior to an announcement. On the news, many of those same professionals will be happy to bank their easy winnings and leave it to the new comers to assume the risk that further rewards may be limited, if they come at all. Not only that, but consider the situation where there has been a major market-moving announcement prior to the open. The professionals are certain to react by wanting to milk the news for all that it is worth. They are in a position to establish the opening price that suits them best and that discounts the value of the news. It happens often, therefore, that market-moving news has the practical effect of having its maximum impact on the open. You need to exercise extreme caution, therefore, in acting on news unless the market itself is clearly wrong footed. Subject to confirming indications, it may be both reasonable and profitable to buy on bullish news when the market is down and to sell on bearish news when the market is up. But beware of buying on bullish news when the market is already overbought or selling when it is already oversold. **<u>Buy the Rumor, Sell the News</u>** Markets generally set up correctly beforehand to follow through on the actual announcement of news if it is going to move the market. Examples of market moving news include crop reports and the monthly employment numbers. However, remember the adage: "Buy on the rumor, and sell on the news!" Following through on this axiom,	**3 X 10= 30**	**CO 2,4**

	in the real world of futures trading it is remarkable how often an apparently unstoppable bull market puts in its high on the announcement of bullish news such as a favorable crop production report. Or how a market puts in its low on bearish news such as a quarterly pig crop report showing greater than generally expected herd expansion. There always comes a time in due course when everyone in the know has maxed out, and smart money is going the other way. Remember, too, Joe Granville's great line: "If it's obvious, it's obviously wrong!" There is another popular saying that a market that is strong should go up on bullish news, and one that is weak should go down on bearish news. If it fails to react as the news suggests that it should, then maybe it will go the other way. In practice, however, markets by no means always respond right away according to this wisdom. The initial reaction may indeed seem to contradict the news, but its impact may appear in price action a couple of days later. It can be that too many people already anticipated the news correctly, and then the market has to digest the rebound from those traders wanting to bank the profit from getting it right. They have bought on the rumor and then have sold on the news, or vice versa. In a sense perhaps contradicting the apparent smarts of knowledgeable traders is the immediate impact of weather in New York and Chicago. When, in winter, it gets really cold in New York, you can expect the price of heating oil to rise regardless of the supply-and-demand fundamentals. When it rains in the summer in Chicago—even just a local thunderstorm—expect the price of grains and soybeans to come down with the rain. Seemingly contradicting this interpretation of the immediate impact of news on short-term fluctuations, the underlying supply-and-demand fundamentals really do matter. When, for example, petroleum inventories are rising week after week or falling week after week, the stocks data form their own trend. Market reaction may be slow to respond and erratic, and it may overreact temporarily when there is a surge one way or the other. However, the supply-and-demand fundamentals, based on real supply and actual use, drive intermediate- and long-term trends, whereas day-by-day market action and, most particularly, intraday market action are the result of many trading decisions that may be random and driven by emotions, stops, and factors that have little bearing on an established trend, when there is one.		

SET II

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Instructions:

SECTION A

S. No.		Marks	CO
Q 1	**Explain the following in not more than 2 lines** 1.) Role of Hedger 2.) Well head price 3.) PADD III 4.) Hub price 5.) NYMEX CMA pricing. 6.) Oil price escalation 7.) 21-day BFOE (Forward Brent) 8.) WTI Posting-Plus (P-Plus) pricing 9.) NBP 10.) Exchange for Physical	**20**	**CO 1,2,3,4**

SECTION B

Q 1.	Analyse how volatility impacts natural gas prices and why oil-linked prices can help mitigate the impact of volatility.	**5**	**CO 1,2**
Q 2.	Explain the current dynamics in the Asian natural gas market	**5**	**CO 2**
Q 3.	Describe the role of price reporting agencies (PRAs) in price identification.	**5**	**CO 1**
Q 4.	Explain the relationship between futures contracts and physical supply.	**5**	**CO 1**

SECTION-C

Q 1.	Differentiate between the three major crude oil benchmarks: Brent, WTI, and Dubai-Oman crude oil benchmarks with the help of examples.	**15**	**CO 1,3**

Q 2.	Explain the key technical approaches and tools that work well together when applied to major energy futures markets.	**15**	**CO 3**
	SECTION-D		
Q1.	**Refer the case below and answer the following questions.** **Case:** Metallgesellschaft Corporation (MG) is the subsidiary of Metallgesellschaft A.G., a German conglomerate with 15 major subsidiaries closely held with over 65% of stock owned by institutional investors including banks. In 1993, MG's trading subsidiary, MG Refining and Marketing (MGRM), established very large energy derivatives (futures and swaps) positions to hedge its price exposure on its forward-supply contracts to deliver gasoline, diesel fuel and heating oil (about 160 million barrels) to its customers over a period of ten years at fixed prices. The counter-parties to forward contracts were retail gasoline suppliers, large manufacturing firms, and some government entities. The central premise of their forward contracts is to supply oil at fixed price to independent retailers who often face severe liquidity crisis and squeezes on margin when oil prices rise. It believed it is possible to arbitrage between the spot oil market and the long-term contract market. This arbitrage required skilled use of the futures markets in oil products, and this was to be MGRM's stock in trade. MGRM developed several novel contract programs. First, it offered a "firm-fixed" program under which the customer would agree to a fixed monthly delivery of oil products at a set price. (102 million barrels of oil products were obligated under this program by September 1993). Second, it offered a "firm-flexible" contracts under which the customers were given extensive rights to set the delivery schedule for up to 20% of its needs in any year, besides the fixed price commitments. (A total of 52 million barrels were contracted under this program). Third, it offered a "guaranteed margin" contracts under which it agreed to make deliveries at a price that would assure the independent operator a fixed margin relative to the retail price offered by its geographical competitors. The contracts could be extended annually for a defined period and at MGRM's discretion. This means they were not firm obligations. (By September 1993, a total of 54 million barrels were committed under this program.) It is the first two programs involving 154 million barrels of obligations for periods up to ten years that constituted MGRM's designated short position in oil. Most of the forward contracts were negotiated during the summer of 1993 when energy prices were low and falling and the contracts came with cash-out option if the energy price were to rise above the contractually fixed prices. The fixed delivery prices were set 3 to 5 dollars higher than the spot price when writing the contracts. Under the cash-out provision, the buyer could choose to sell the remainder of its forward obligations back to MGRM for a cash payment of one-half the difference between the prevailing near month futures price and the contractually fixed supply price times the total volume remaining on the contract. MGRM opted for early exercise sell-back options instead of negotiated unwinding. These options take effect	**5 X 6= 30**	**CO 2,4**

when the front-month futures rises above the fixed delivery price in the flow contract. Although customers might wish to exercise these sell-back options, if they expect spot prices in the future to fall, they might well wish to do so even if they regarded a surge in spot prices as permanent. Remember, that they must compare the immediate cash payment with the PV of expected future difference between spot prices and the delivery prices over the remaining life of the contract.

MGRM's fixed price forward delivery contracts exposed it to the risk of rising energy prices. MGRM hedged this price risk with energy futures contracts of between one to three months to maturity at NYMEX and OTC swaps. The objective of its hedging strategy was to protect the profit margins in its forward delivery contracts by insulating them from increases in energy prices. MGRM would gain substantially from its derivative positions if the energy prices rise. During the later part of 1993, however, energy prices fell sharply ($19 a barrel in June 93 to $15 a barrel in Dec. 93) resulting in unrealized losses and margin calls on derivative positions in excess of $900 million. To complicate the matter, the futures market went into a contango price relationship for almost entire year in 1993 increasing cost each time it rolled its derivatives. The MG's Supervisory Board responded to the situation of mounting margin calls by replacing MG's top management and liquidating MGRM's derivative positions and forward supply contracts which ended MG's involvement in the oil market. It suffered derivative related loss of $1.3 billion by the end of 1993. The new management team declared that "speculative oil deal had plunged MG into the crisis….." Only a massive $1.9 billion rescue operation by 150 German and international banks kept MG from going into bankruptcy.

One reason for not buying forward contracts for the same maturity is that market for long-dated oil contracts is small - only about 10 firms made prices in this market. Another reason is that the MG's credit rating was low enough for those firms to be exposed to it for long. (Economist) If energy prices had risen rather than fallen, MGRM would not have had a problem. It would have had unrealized gains on its derivatives position, and positive margin flows from the forward contracts. Although it would have had unrealized losses on its forward contracts, it would not have mattered as it would be offset by the unrealized gains on its derivative positions.

MGRM's hedging strategy included short-dated energy futures contracts and OTC swaps – a "stack and roll" or "rolling stack" strategy. Under this strategy, MGRM opened a long position in futures staked in the near month contract. Each month MGRM would roll the stack over into the next near month contract, gradually decreasing the size of the position. Under this plan the total long position in the stack would always match the short position remaining due under the supply contracts. It bought long futures positions on the NYMEX (equivalent to 55 m. barrels of gasoline, heating oil and crude oil) and entered into OTC energy swaps (100 to 110 m. barrels) with swap dealers (mostly banks) entitling it to receive payments based upon floating

energy prices while making fixed payments. MGRM's total derivative's position was almost equal to its forward commitments, a barrel for barrel hedge or with hedge ratio of one. The short- term nature of the derivatives called for continuous roll forward to maintain the hedge position. This exposed the firm to rollover risk. A stack hedge refers to a futures position being "stacked" or concentrated in a particular delivery month (or months) rather than being spread over many delivery months. The stack and roll strategy can be profitable when markets are in "backwardation," that is, when spot prices are higher than futures prices. But when markets are in "contango," that is, when futures prices are higher than spot prices, the strategy will result in losses.

Critics assert that MGRM's strategy exposed it to three significant and related risks: rollover risk, funding risk, and credit risk, because of the maturity mismatch between the hedge and the delivery contracts and other features. It was exposed to rollover risk because of uncertainty about whether it would sustain gains or losses when rolling its derivatives position forward. It is exposed to funding risk because of the marked-to-market conventions that applied to its short-dated derivative's position. It is exposed to credit risk because of its forward delivery counter-parties might default on their long-dated obligations to purchase oil at fixed prices. If the energy prices fell, this risk is expected to increase because of the increase in the difference between contractual prices and prevailing spot prices. To minimize the credit risk, MGRM limited the annual volume supplied under contract to no more than 20% of the customer's needs and included in the contracts a cash-out option. It could, however, be a factor in MGRM's ability to raise funds against the collateral of these contracts.

Another feature of MGRM's hedging strategy, which entails mismatched maturity structure, is that it exposed the firm to excessive amount of basis risk-variations in the value of the short-dated futures positions not compensated by equal and opposite variations in the value of the long-dated delivery contracts because of a one-for-one hedge it entailed. One barrel of oil for delivery in one month is simply not equal in PV to one barrel of oil for delivery in ten years and the value of two different dated obligations do not move in lock step. In general, spot prices are more variable than the futures prices. This is a feature that all hedgers must deal with. Hedgers in the futures market are "speculators on the basis," trading greater price risk for a lessor basis risk. The basis risk is the difference between the price of the instrument and the price of the underlying asset being hedged.

A rolling stack of short-dated futures initially increases the variance of cash flows. This occurs because movements in the price of oil within the month create losses or gains on the entire stack of contracts. These losses or gains must be settled by the end of the month; while compensating gains or losses on deliveries are realized only gradually over the remaining ten years of the delivery contract. When cash flows matter, the rolling stack may be worse than no hedge at all.

It has been concluded that MGRM has been losing money on its futures position throughout 1993. The consequences had already been felt within the U.S subsidiary by the end of the summer as the firm's credit lines were used up. When the oil price fell yet more precipitously at the end of the year, the company did not have sufficient

cash to continue to roll over its stack of oil futures contracts as planned and could not meet a large number of its other obligations until it received an emergency line of credit from its bankers. Losses eventually totaled nearly $1.3 billion. By January the firm was close to declaring bankruptcy and its future was not clear.
MG eventually negotiated a $1.9 billion bailout from its bankers in tandem with a plan to shed assets such as its auto parts manufacturing business, its tin mining operations, its recently acquired heating equipment and others. The price of MG share fell by half between November 1993 and February 1994 as a consequence.

QUESTIONS :

1. Why did the MG's Supervisory Board end its forward delivery program and liquidate its derivative positions in response to large unrealized losses in derivatives position when, in fact, its forward delivery contracts were in the money?

2. Did the Board panic in the face of huge margin calls?

3. Could it be that the Board did not understand the full implications of the hedge strategy and panicked in the face huge margin calls?

4. Did MG have funding problems?

5. Some critics say that MGRM's stack and roll strategy was flawed because it exposed it to rollover risk, funding risk, and credit risk. Is this the reason for liquidating the derivatives position?

6. Why did management choose a hedge with a mismatched maturity structure? Why did management run such a large stack?