

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, May 2021

Programme : B.TECH APE GAS

Semester : IV

Course Name : Drilling Technology

Time : 03 hrs.

Course Code : PEAU 2009

Max. Marks: 100

Nos of Page(s) : 06

Instructions: All questions are Compulsory

SECTION A

1. Each Question will carry 5 Marks

2. Instruction: Complete the statement / Select the correct answer(s)

S. No.		Marks	CO
Q 1	<p>I. Detection of Kick becomes difficult on use of _____ as drilling fluid:</p> <p>(a)polyol muds (b)Oil based mud (c)Calcium muds (d)Lignosulphonate mud</p> <p>II. Which of the the following mud type is preferred during drilling shale formations:</p> <p>(a)KCL/Polymer mud (b)Calcium mud (c)Lignosulphonate mud (d)Both (a) and (b) (e)All of above</p> <p>III. Filtration of drilling mud will start in which of following situation:</p> <p>(a)There is positive differential pressure in direction of rock. (b)There is negative differential pressure in direction of rock (c)no relation with pressure difference (d)When RPM of drill string is low</p> <p>IV. What is the amount of water and Barite used in a typical oil based mud?</p> <p>(a)5% and 10% (b)30% and 10% (c)50%and 30% (d)3% and 5%</p> <p>V. With increase in pressure overbalance the ROP will:</p> <p>(a)increase (b)remain constant (c)Decrease (d)first increase then decrease</p>	5M	CO1

<p>Q 2</p>	<p>I. What is casing used for?</p> <ul style="list-style-type: none"> a. To isolate downhole zones so they can be produced separately b. To allow near surface water zones to enter the wellbore c. To line the trench dug to lay pipeline d. To control pressure in catalytic crackers <p>II. The depth below the surface used to calculate bottom hole pressures is</p> <ul style="list-style-type: none"> a. Outer diameter b. Total depth c. True vertical depth d. Measured depth <p>III. Conductor.....</p> <ul style="list-style-type: none"> a. Final casing, bottom part cemented to cover zones of interest b. Very short string used in unconsolidated soil conditions like sand or mud c. Short casing string run from bottom of previous casing string d. None of these <p>IV. Short casing string run from bottom of previous casing string</p> <ul style="list-style-type: none"> a. Conductor b. Liner c. Production d. Surface <p>V. Which is used to keep cement separated from mud?</p> <ul style="list-style-type: none"> a. Casing shoe b. Centralizers c. Coring d. Wiper plugs 	<p>5M</p>	<p>CO2</p>
<p>Q 3</p>	<p>1. What is meant by Primary Well Control</p> <ul style="list-style-type: none"> (a) The use of pit volume and flow rate measuring devices to recognize a kick (b) The slow circulating rate pressure used in the kill process (c) The use of mud hydrostatic to balance fluid pressures in the formation (d) The use of Blow out preventers to close in a flowing well <p>2. Will a kick occur in the event of a loss of return?</p> <ul style="list-style-type: none"> (a) No, it depends on the drill string weight reduction noted on the weight indicator (b) No, it depends on the mud level in the annulus and the formation pressure (c) Yes, losses will always occur above any potential kick zone. (d) None of the above. <p>3. Which of the following factors will not increase the circulating pressure?</p> <ul style="list-style-type: none"> (a) Increase in the drilled depth (b) Increase in the length of BHA (c) Decrease in the mud density during drilling 	<p>5M</p>	<p>CO3</p>

	<p>(d) None of the above</p> <p>4. Which of following practices are likely to increase the chances of swabbing?</p> <p>(a) Pulling pipe slowly</p> <p>(b) Pulling pipe fast</p> <p>(c) Pulling through tight spots with pump on</p> <p>(d) Pulling pipe very slowly</p> <p>5. After recognizing a drilling break, what is the first action to be taken?</p> <p>(a) Circulate bottoms up</p> <p>(b) Continue drilling</p> <p>(c) Reduce pump speed</p> <p>(d) Make a flow check</p>		
Q 4	<p>I. If the Kelly is not made up on the drill string and flow comes up the drill string, what can be used to stop the flow?</p> <p>(a) Lower Kelly cock</p> <p>(b) Pipe ram</p> <p>(c) Full opening safety valve</p> <p>(d) Annular preventer</p> <p>II. Drilling muds should have a pH of at least</p> <p>(a) 3</p> <p>(b) 7</p> <p>(c) 9</p> <p>(d) 12</p> <p>III. Where would a small quantity of high viscosity mud, also called a pill, be mixed?</p> <p>(a) Settling tank</p> <p>(b) Reserve tank</p> <p>(c) Slug tank</p> <p>(d) Chemical tank</p> <p>IV. What is the purpose of hydro cyclone equipment?</p> <p>(a) To remove gas from the mud</p> <p>(b) To remove particles from the mud</p> <p>(c) To pump mud</p> <p>(d) To mix mud with additives</p> <p>V. Casing grade N-80, in this grade 80 represents:</p> <p>(a) Minimum tensile strength</p> <p>(b) Minimum yield strength</p> <p>(c) Maximum tensile strength</p> <p>(d) Maximum yield strength</p>	5M	CO4
Q 5	<p>I. What is the function of shear blind ram?</p> <p>(a) To shear the drill pipe and seal the well bore simultaneously</p> <p>(b) To shear around the hexagonal and square Kelly</p> <p>(c) To only shear any kind of tubular in the well</p> <p>(d) To hold the drill pipe</p> <p>II. Will a kick occur in the event of a loss of return?</p> <p>(a) No, it depends on the drill string weight reduction noted on the weight indicator</p>	5M	CO4

	<p>(b) None</p> <p>(c) Yes, losses will always occur above any potential kick zone</p> <p>(d) No, it depends on the mud level in the annulus and the formation pressure</p> <p>III. After recognizing a drilling break, what is the first action to be taken?</p> <p>(a) Circulate bottoms up</p> <p>(b) Continue drilling</p> <p>(c) Reduce pump speed</p> <p>(d) Make a flow check</p> <p>IV. Which of the following possible warning signs indicate that well may go under balance?</p> <p>(a) Increase in pump pressure</p> <p>(b) Reduction in rate of penetration</p> <p>(c) Increase in weight on bit</p> <p>(d) Change in cutting size & shape</p> <p>V. How often should the MAASP be recalculated?</p> <p>(a) After every bit change</p> <p>(b) After every 500 ft. drilled</p> <p>(c) After a change in mud weight</p> <p>(d) After every POOH operation</p>		
<p>Q 6</p>	<p>I. While drilling, the mud weight was increased from 10 ppg to 11.2 ppg expecting little higher formation pressure below. How this increase of mud weight will affect MAASP (the casing shoe is at 4697 ft. TVD)?</p> <p>(a) Decrease by 293 psi</p> <p>(b) Increase by 293 psi</p> <p>(c) Decrease by 250 psi</p> <p>(d) Increase by 250 psi</p> <p>II. Where hydraulic fluid is stored to operate BOP valve:</p> <p>(a) Trip tank</p> <p>(b) Accumulator</p> <p>(c) Mud-Gas separator</p> <p>(d) Mud pit</p> <p>III. Unusual changes in mud level while tripping can be monitored as</p> <p>(a) The mud pit</p> <p>(b) The trip tank</p> <p>(c) The bop stack</p> <p>(d) The bop control panel</p> <p>IV. If the breakout catheads pulling force is not strong to break out a very large drill collar, what can be used?</p> <p>(a) Spinning wrench</p> <p>(b) Hydraulic cathead</p> <p>(c) Makeup cathead</p> <p>(d) Kelly spinner</p> <p>V. What information does the weight of indicator shows?</p> <p>(a) Weight of drill pipe</p> <p>(b) Weight on bit</p>	<p>5M</p>	<p>CO3</p>

	(c) Hook load (d) B & C		
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SECTION B

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

Q 7	Define the term "BIT DESIGN" and explain in detail about roller cone bit design.	10M	CO2
Q 8	For a given depth, well orientation and rock type, it is usually possible to select a mud weight which is appropriate from a rock mechanics point of view i.e wellbore failure is prevented. Explain why this is possible, addressing all types of wellbore failure in your answer?	10M	CO3
Q 9	a) Explain how Removal of Drilling fluid is done before drilling cementing and why it is important? (5 Marks) b) Mention and write short notes on Properties of cementing additives (5 Marks)	10M	CO4
Q 10	Discuss the killing procedure followed in "Driller's Method"	10M	CO3
Q 11	Describe the main factors, which influence the pressure loss when circulating fluid through the drill string and annulus when drilling?	10M	CO2

SECTION-C

- 1. Each Question carries 20 Marks.**
2. Instruction: Write long answer.

Q 12	Use the following data and fill out the kill sheet. DATA: 8 ½ Hole Depth = 13600 ft MD. = 5000 ft TVD. KOP = 2000 ft. EOB = 5400 ft MD. = 4285 ft TVD. 9 5/8 inch casing set at = 9000 ft MD. = 4600 ft TVD. Drill Pipe 5", Capacity = 0.0178 bbl/ft. 5" HWDP = 180 ft. = capacity=0.0087 bbl/ft. 6 ¼ " Drill collar = 150 ft. = capacity= 0.0061 bbl/ft. Mud in Use = 10.9 ppg. Volume Open Hole/Drill Collar = 0.0323 bbl/ft. Volume Open Hole/Drill pipe/HWDP = 0.0459 ft. Volume Casing/Drill Pipe = 0.0515 bbl/ft. LOT DATA: Shoe Leaked at 1120 psi with 10.4 ppg MUD Mud Pump Out Put = 0.12 bbl/stks. Slow Circulating Pressure = 625 psi at 30 spm. <u>Well Kick Data:</u> SIDPP = 875 psi.	20M	CO4
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SICP = 895 psi.
Pit Gain = 15 bbl.

Also, fill the following data from filled kill sheet

- (i) Strokes surface to bit = -----
strokes.
- (ii) Strokes bit to shoe = -----
strokes.
- (iii) Strokes bit to surface = -----
strokes.
- (iv) Kill Mud weight = -----
ppg.
- (v) Initial circulating Pressure = -----
psi.
- (vi) Final Circulating Pressure = -----
psi.
- (vii) MAASP with current mud weight = -----
psi.
- (viii) MAASP after circulation of kill mud = -----
psi.
- (ix) Time for complete circulation = -----
min.
- (x) Circulating Pressure at KOP = -----
psi.
- (xi) Circulating Pressure at EOB = -----
psi.
- (xii) Pressure Drop/ 100 strokes up to KOP = -----
psi/ 100 strokes.
- (xiii) Pressure Drop/ 100 strokes from KOP to EOB = -----
psi/ 100 strokes.
- (xiv) Pressure Drop/ 100 strokes from EOB to bit. = -----
psi/ 100 strokes.