Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Program Name : B. Tech (Applied Petroleum Engineering-Up Stream) **Semester** : IV

Course Name : Drilling Engineering and Well Construction **Time** : 03 hrs.

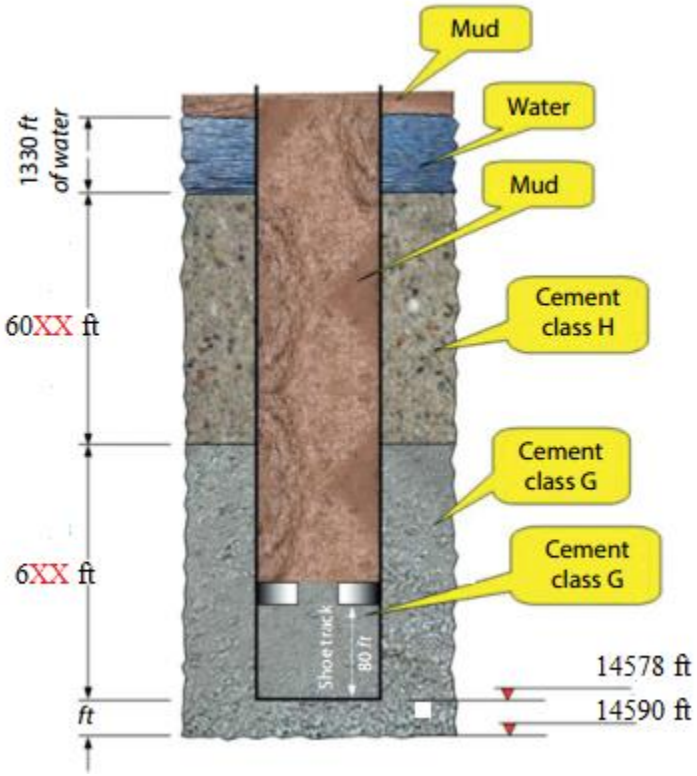
Course Code : **PEAU 2008** **Max. Marks:** 100

Nos. of page(s) : Six only

Instructions: *Answer should be precise & to the point.*

SECTION - A

S. No.		**Marks**	**CO**
Q 1	You are the company man on a well being drilled. Well takes a kick. What will be your course of action?	5	CO5
Q2	Well data Depth (TVD) : 89XX feet **(Replace XX with last two digits of your SAP ID)** Mud weight : 11.9 ppg Pressure losses at 100 spm Surface lines : 75 psi Drill string : 725 psi Bit : 850 psi Annulus : 100 psi Calculate; a. Static BHP psi b. BHCP psi	5	CO3
Q3	Optimizing weight on bit (WOB) is an essential part of drilling to ensure that the well deepens as drilling moves forward. Justify.	5	CO2
Q4	What is the normal range of pH of a drilling mud? Why a very high pH is undesirable in drilling muds?	5	CO2
Q5	You being a cementing engineer, what measures you will take for a successful cementing job.	5	CO3
Q6	1. Monel drill collar is another name for _____drill collars. 2. The _____BOP can be used for closing the well around any pipe size, but for lower pressure rating. 3. If the 1000 ft well has to be drilling, the requirement for drum should be___HP. 4. The normal industry practice is to keep the overbalance pressure at around_____Psi. 5. When the LOT should be performed during drilling-_____.	5	CO5 CO5 CO5 CO5

			C05
SECTION B (Scan and Upload)			
Q 7	A 8 1/ 2" diameter hole is drilled up to 7,5XX ft with a density of 12.5 ppg. If the formation pore pressure at this point is 4500 psi. Calculate i) mud pressure overbalance above the pore pressure, ii) if the mud density is 10.5 ppg, what would be the overbalance, and iii) if the fluid level in the annulus is dropped to 250 ft due to inadequate hole fill up during tripping, what would be the effect on bottom-hole pressure? **Note: Replace XX with last two digits of your SAP id.**	3+3+4=10	CO2
Q 8	Describe the applications of Directional Drilling Techniques. Highlight the constraints on the trajectory of a deviated well.	5+5=10	CO4
Q 9	What is the objective of well completion? Discuss advantages and disadvantages of both Open Hole and Cased Hole completion.	4+6=10	CO5
Q10	With the help of the given data and schematic in Figure, calculate the following: i) Quantity of cement of class G and H, and ii) Volume of mix Water. Replace XX with last two digits of your SAP ID.  ***Given data:*** Hole depth : 14,590 *ft* Shoetrack : 80 *ft* Hole size : 8.25 *inch* Casing dimensions, *OD*/*ID* : 7 *inch*/6.2 inch	10	C05

	Mixwater required for Class G : 5 *gallon/sack* Slurry yield of Class G : 1.15 ft^3/*sack* Mixwater required for Class H : 5.49 *gallon/sack* Slurry yield of Class H : 1.22 ft^3/*sack*		
Q11	A triplex pump is pumping a 14.5 ppg mud into the borehole and has a current circulating pressure of 17XX psi and a pump rate of 50 spm. Answer the following based on this data: 1) If the pump rate is changed to 35 spm, calculate the new pump pressure *(Considering the mud weight remains constant).* 2) Calculate the new pump pressure if mud weight is changed to 13.2 ppg *(assume pump rate remains constant).* **Note : Replace XX with last two digits of your SAP ID**.	5+5=10	CO3
SECTION-C (Scan and Upload all the calculations)			
Q12	Original mud weight = 9.6 ppg Measured depth = 10,0XX ft Kill rate pressure @ 50 spm = 1000 psi **Drill string**: drill pipe 5.0 in. — 19.5 lb/ft capacity = 0.01776 bbl/ft HWDP 5.0 in. 49.3 lb/ft capacity = 0.00883 bbl/ft length = 250 ft **drill collars** 8.0 in. OD — 3.0 in. ID capacity = 0.0087 bbl/ft length = 350 ft **Annulus:** hole size = 12 1/4 in. drill collar/open hole capacity = 0.0836 bbl/ft drill pipe/open hole capacity = 0.1215 bbl/ft drill pipe/casing capacity = 0.1303 bbl/ft Mud pump (7 in. x 12 in. triplex @ 95% eff.) = 0.136 bbl/stk Leak-off test with 9,0 ppg mud = 1130 psi Casing setting depth = 4000 ft Shut-in drill pipe pressure = 450 psi Shut-in casing pressure = 550 psi Pit volume gain = 40 bbl True vertical depth = 10,000 ft **Note : Replace XX with last two digits of your SAP ID** Use the above data to answer the following questions.	2x10=20	CO5

(A) SURFACE TO BIT STROKES ----------

(B) BIT TO SHOE STROKES ----------

(C) BIT TO SURFACE VOLUME ----------

(D) KILL MUD WEIGHT ----------

(E) INITIAL CIRCULATING PRESSURE ----------

(F) FINAL CIRCULATING PRESSURE ----------

(G) MAASP WITH CURRENT MUD WEIGHT ----------

(H) MAASP AFTER CIRCULATING KILL MUD ----------

(I) TIME FOR COMPLETE ONE CIRCULATION ----------

(J) PRESSURE DROP PER 100 STROKES ----------

Surface BOP (Vertical Well) Kill Sheet	API Field Unit

Formation Strength Data:

Surface Leak-off Pressure	(A)	psi
Mud Weight	(B)	ppg

Maximum Allowable Mud Weight

$$(B) + \frac{(A)}{\text{Shoe True Vertical Depth} \times 0.052}$$

(C) ppg

Initial MAASP

{(C) –Current Mud Weight} x Shoe TVD x 0.052 =

psi

Pump No.1 Displacement	Pump No.2 Displacement
bbls /stroke	bbls / stroke

Slow Pump Rate Data	Dynamic Pressure Loss (PL) Pump No. 1	Pump No. 2
Spm		
Spm		

Current Well Data :

Mud data:

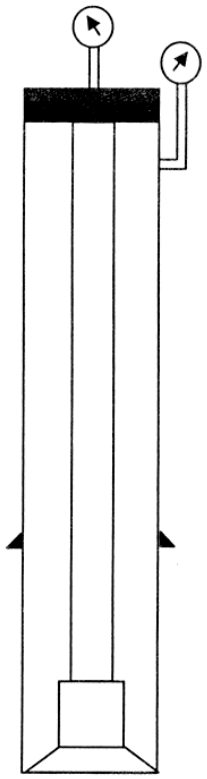
Mud Weight ppg

Casing Shoe Data:

Size	in.
M.D.	ft.
T.V.D.	ft.

Hole Data:

Size	in.
M.D.	ft.
T.V.D.	ft.



Pre-Volume Data:	Length Ft.		Capacity Bbls/ft.	Volume Bbls	Pump Strokes	Time minutes
Drill Pipe		x	=		Volume / Pump Displacement	Pump Strokes / Slow Pump Rate
Heavy Wall Drill Pipe		x	=			
Drill Collars		x	=			
Drill String Volume				(D) bbl	(E) stks	min

DC x Open Hole	x	=			
DP/HWDP x Open Hole	x	=			
Open Hole Volume			(F) bbl	stks	min

DP x Casing	x	=	(G) bbl	stks	min

Total Annulus Volume	(F +G) = (H) bbl	stks	min
Total Well System Volume	(D+H) = (I) bbl	stks	min

Kick Data					
SIDPP		psi	SICP		psi	Pit Gain		bbls

Kill Mud Weight **KMW**	Current Mud Weight + $\frac{\text{SIDPP}}{\text{TVD X 0.052}}$	= ppg

Initial Circulating Pressure **ICP**	Dynamic Pressure Loss + SIDPP	= psi

Final Circulating Pressure **FCP**	$\frac{\text{Kill Mud Weight}}{\text{Current Mud Weight}}$ x Dynamic Pressure Loss	= psi

(K) = ICP – FCP = = psi	$\frac{(K) \times 100}{(E)}$ = psi / 100 strokes

Strokes	Pressure