Name: Roll No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Sem Examination, DEC-2021

Programme Name: M.Sc. (Hons.) Petroleum Geoscience **Semester: III**
Course Name: Drilling and Production Operations **Time: 03 hrs**
Course Code: PEGS8006 **Max. Marks: 100**

Instructions:

- **All questions are compulsory.**
- **However, internal choice has been provided. You have to attempt only one of the alternatives in all such questions.**
- **Write the answers on an A4 sheet with your name and roll number mentioned on each page. Write clearly, scan and upload properly.**

SECTION A (4x5=20 Marks)
All Questions are compulsory

S. No.		Marks	CO
Q1	Define BOP and its types	**04**	**CO1**
Q2	Define Hydrostatic Pressure and Formation pressure	**04**	**CO2**
Q3	Distinguish between MWD & LWD	**04**	**CO3**
Q4	Discuss selection criteria for the PDC bits	**04**	**CO2**
Q5	Discuss types of mist extractors	**04**	**CO3**

SECTION B (40 Marks)
All the questions are compulsory

Q 6	Explain in detail about the procedure of killing a well using following methods: a) Driller's Method b) Wait and Weight Method	**10**	**CO1**
Q 7	a) Summarize different considerations needed while planning a directional well. b) Explain Kick off point and horizontal drilling and ERD well.	**10**	**CO2**
Q 8	Discuss the functions of any two components used in BHA. Explain about SIDPP and SICP. **OR** Define well stimulation. Explain the Acidizing and hydraulic fracturing and also discuss about the perforation fluids.	**10**	**CO3**

Q 9	Define Artificial methods and their classification. Discuss sucker rod pump method with their diagram and mechanism **OR** Explain Christmas tree components with neat clean diagram and Explain types of well completions with diagram and their advantages & disadvantages?	**10**	**CO4**
	SECTION-C (40 Marks) **All the questions are compulsory**		
Q 10 Q 10	Explain in detail about different types of Casings along with neat diagram and their dimensions. Also discuss the functions of each casing. **OR** I. Calculate the Drill collar Dimensions and weights: a. What is the weight in air of 200 ft of 9 1/2" x 2 13/16" drill collar? b. What is the weight of this drill collar when immersed in 12 ppg mud? c. It is not uncommon for 5" 19.5 lb/ft drill pipe to be used in the same string as 8 1/4" x 2 13/16" drill collars. Compare the nominal I.D. of this drill pipe and Drill collar size and note the differences in wall thickness of these tubulars. II. The highest rate of penetration for a particular 12 1/4" bit will be achieved when 25,000lbs weight on bit (Wob) is applied to the bit. Assuming that the bit will be run in 12 ppg mud, calculate the length of drill collars required to provide 25,000 lbs Wob. a) Calculate the weight (in air) of 10000 ft of 5" 19.5 lb/ft Grade G drill pipe with 4 1/2" IF connections. b) Calculate the weight of this string in 12 ppg mud. Also, Calculate the length of 9 1/2" x 2 13/16" drill collars that would be required to provide 25,000lbs Wob and keep the drill pipe in tension in 12 ppg mud.	**20**	**CO3**
Q 11	Calculate the minimum required size of a standard oil/gas separator for the following conditions. Consider both vertical and horizontal separators. a) Assuming a 20-in. 7½-ft vertical separator b) 16-in. 5-ft horizontal separator $\mathbf{z} = 0.8427$ $\mathbf{p}_g = 3.38$ lbm/ft^3		

		Gas flow rate: 5.0 MMscfd Gas-specific gravity: 0.7 Condensate flow rate: 20 bbl/MMscf Condensate gravity: 60 ^{0}API Operating pressure: 800 psia Operating temperature: 80 ^{0}F	**20**	**CO5**

Separator type	K
Vertical separators	0.06–0.35
Horizontal separators	0.40–0.50

Settling Volumes of Standard Vertical High-Pressure Separators (230–2,000 psi working pressure) V_L (bbl)		
Size (D x H)	Oil/Gas separators	Oil/Gas/Water separators
20-in. x 7½-ft	0.65	1.15

Settling Volumes of Standard Horizontal High-Pressure Separators (230–2,000 psi working pressure) V_L(bbl)			
Size (D x L)	½ Full	⅓ Full	¼ Full
16-in.x 5-ft	0.61	0.35	0.24

OR

Q 11 Explain the various types of Separators with neat and clean diagram in details. Also discuss the 3 phase separators mechanism.

All The Best !!

Tables

CAPACITY AND DISPLACEMENT OF DRILLPIPE

SIZE AND CONN.	NOMINAL WEIGHT LB/FT	GRADE	APPROX WEIGHT LB/FT	CAPACITY L/M	CAPACITY GALL/FT	OPEN END DISPLACEMENT L/M	OPEN END DISPLACEMENT GALL/FT	CLOSED END DISPLACEMENT L/M	CLOSED END DISPLACEMENT GALL/FT
2 3/8		E75	7.00			1.39	0.107	3.01	0.242
2 3/8	6.65	X95	7.08	1.68	0.135	1.34	0.108	3.02	0.243
IF		G105	7.08			1.34	0.108	3.02	0.243
NC26									
2 7/8		E75	10.82			2.05	0.165	4.41	0.355
2 7/8	10.4	X95	10.89	2.36	0.190	2.06	0.166	4.42	0.356
IF		G105	10.89			2.06	0.166	4.42	0.356
NC 31		S135	11.20			2.12	0.171	4.48	0.361
	9.5	E75	10.39	4.54	0.366	1.97	0.159	6.51	0.525
		E75	13.86	3.88	0.312	2.63	0.212	6.51	0.524
3 1/2	13.3	X95	14.32	3.96	0.319	2.71	0.218	6.67	0.537
3 1/2		G105	14.38	3.87	0.312	2.73	0.220	6.60	0.532
IF		E75	16.42			3.11	0.250	6.57	0.529
NC38	15.5	X95	16.54	3.46	0.279	3.14	0.253	6.60	0.532
		G105	16.61			3.15	0.254	6.61	0.533
		E75	20.99			3.98	0.320	13.14	1.058
5		X95	21.09			4.00	0.322	13.16	1.070
	19.5	G105	21.50	9.16	0.738	4.08	0.329	13.24	1.087
4 1/2		S135	22.09			4.19	0.337	13.35	1.075
IF		E75	27.01	8.11	0.653	5.12	0.412	13.23	1.065
NC50	25.6	X95	28.30	8.10	0.652	5.36	0.432	13.46	1.084
		G105	28.11	8.09	0.651	5.33	0.429	13.42	1.080

DRILL COLLAR WEIGHTS (STEEL) POUNDS PER FOOT

lbs/ft = 2.67 (OD^2 - ID^2)

Collar O.D.	BORE OF COLLAR										
	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3	3-1/4	3-1/2	3-3/4	4
3-3/8	24.4	22.2									
3-1/2	26.7	24.5									
3-3/4	31.5	29.3									
3-7/8	34.0	31.9	29.4	26.5							
4	36.7	34.5	32.0	29.2							
4-1/8	39.4	37.2	34.7	31.9							
4-1/4	42.2	40.0	37.5	34.7							
4-1/2	48.0	45.8	43.3	40.5							
4-3/4	54.2	52.0	49.5	46.7	43.5						
5	60.2	58.5	55.9	53.1	49.9						
5-1/4	67.5	65.3	62.8	59.9	56.8	53.3					
5-1/2	74.7	72.5	69.9	67.2	63.9	60.5	56.7				
5-3/4	82.1	79.9	77.5	74.6	71.5	67.9	64.1				
6	89.9	87.8	85.3	82.5	79.3	75.8	71.9	67.8	63.3		
6-1/4	98.1	95.9	93.5	90.6	87.5	83.9	80.1	75.9	71.5		
6-1/2	106.6	104.5	101.9	99.1	95.9	92.5	88.6	84.5	79.9		
6-3/4	115.5	113.3	110.8	107.9	104.8	101.3	97.5	93.3	88.8		
7	124.6	122.5	119.9	117.1	113.9	110.5	106.6	102.5	97.9	93.1	87.9
7-1/4	134.1	131.9	129.5	126.6	123.5	119.9	116.1	111.9	107.5	102.6	97.5
7-1/2	143.9	141.7	139.3	136.5	133.3	129.8	125.9	121.8	117.3	112.5	107.3
7-3/4	154.1	151.9	149.5	146.6	143.5	139.9	136.1	131.9	127.5	122.6	117.5
8	164.6	162.5	149.9	157.1	153.9	150.5	146.6	142.5	137.9	133.1	127.9
8-1/4	175.4	173.3	170.8	167.9	164.8	161.3	157.5	153.3	148.8	143.9	138.8
8-1/2	186.6	184.4	181.9	179.1	175.9	168.6	172.5	164.5	159.9	155.1	149.9
8-3/4	198.1	195.9	193.9	190.6	187.4	183.9	180.1	175.9	171.4	166.6	161.5
9	———	207.8	205.3	202.4	199.3	195.8	191.9	187.8	183.3	178.5	173.3
9-1/2	———	232.4	229.9	227.1	223.9	220.4	216.6	212.4	297.9	203.1	197.9
10	———	———	255.9	253.1	249.9	246.4	242.6	238.4	233.9	229.1	223.9
10-1/2	———	———	283.3	280.4	277.3	273.8	269.9	265.8	261.3	256.4	251.3
11	———	———	———	———	305.9	302.4	298.6	294.4	289.9	285.1	279.9

MUD DENSITY, GRADIENT AND BUOYANCY FACTOR

NOTE: Buoyancy factor is for STEEL only

Mud density			Gradient	Buoyancy	Mud density			Gradient	Buoyancy
kg/m³	lb/gall	lb/ft³	psi/ft	Factor	kg/m³	lb/gall	lb/ft³	psi/ft	Factor
1000	8.34	62.4	.433	.873	1800	15.0	112	.779	.771
1010	8.40	62.8	.436	.872	1820	15.2	114	.790	.768
1030	8.50	64.3	.447	.869	1850	15.4	115	.800	.765
1060	8.80	65.8	.457	.866	1870	15.6	117	.810	.762
1080	9.00	67.3	.468	.862	1890	15.8	118	.821	.759
1100	9.20	68.8	.478	.860	1920	16.0	120	.831	.755
1130	9.40	70.3	.488	.858	1940	16.2	121	.842	.753
1150	9.60	71.8	.499	.853	1970	16.4	123	.852	.749
1154	9.625	72.0	.500	.853	1990	16.6	124	.862	.746
1180	9.80	73.3	.509	.850	2010	16.8	126	.873	.743
1200	10.0	74.8	.519	.847	2040	17.0	127	.883	.740
1220	10.2	76.3	.530	.844	2060	17.2	129	.894	.737
1250	10.4	77.8	.540	.841	2090	17.4	130	.904	.734
1270	10.6	79.3	.551	.838	2110	17.6	132	.914	.731
1290	10.8	80.8	.561	.835	2130	17.8	133	.925	.728
1320	11.0	82.3	.571	.832	2160	18.0	135	.935	.725
1340	11.2	83.8	.582	.829	2180	18.2	136	.945	.722
1370	11.4	85.3	.592	.826	2210	18.4	138	.956	.719
1390	11.6	86.8	.603	.823	2230	18.6	139	.966	.716
1410	11.8	88.3	.613	.820	2250	18.8	141	.977	.713
1440	12.0	89.8	.623	.817	2280	19.0	142	.987	.710
1460	12.2	91.3	.634	.814	2300	19.2	144	.997	.707
1480	12.4	92.8	.644	.810	2330	19.4	145	1.01	.704
1510	12.6	94.3	.655	.808	2350	19.6	147	1.02	.701
1530	12.8	95.8	.665	.804	2370	19.8	148	1.03	.698
1560	13.0	97.3	.675	.801	2400	20.0	150	1.04	.694
1580	13.2	98.7	.686	.798	2420	20.2	151	1.05	.692
1610	13.4	100	.696	.795	2450	20.4	153	1.06	.688
1630	13.6	102	.706	.792	2470	20.6	154	1.07	.685
1650	13.8	103	.717	.789	2490	20.8	156	1.08	.682
1680	14.0	105	.727	.786	2520	21.0	157	1.09	.679
1700	14.2	106	.738	.783	2540	21.2	159	1.10	.676
1730	14.4	108	.748	.780	2570	21.4	160	1.11	.673
1750	14.6	109	.758	.777	2590	21.6	162	1.12	.670
1770	14.8	111	.769	.774	2610	21.8	163	1.13	.667