Name: **Enrolment No:**	

UPES
End Semester Examination, May 2023

Course: Safety in Drilling
Semester: II
Program: M.Tech (HSE) **Time : 03 hrs.**
Course Code: HSFS 7008 **Max. Marks: 100**

Instructions:

- ✓ This question paper contains three sections. All questions are compulsory.
- ✓ No codes and additional support material is allowed for reference.
- ✓ Any data missing, may be suitably assumed and stated.
- ✓ Draw figures, wherever necessary to support your answer.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Discuss the properties of drilling fluids?	**4**	**CO1**
Q 2	Explain the causes and indication of well kick?	**2+2**	**CO1**
Q 3	Why borehole filling is so important during trips?	**4**	**CO1**
Q 4	Draw a diagram showing main parts of a "Hoisting System".	**2+2**	**CO1**
Q 5	List out wide variety of ***job prospects*** in & around "***Safety in Drilling"***.	**4**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Explain SIDPP and SICP? Which value is greater SIDPP or SICP and why?	**5+5**	**CO2**
Q 7	A 8 1/ 2" diameter hole is drilled up to 7,500 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?	**3+3+4**	**CO3**
Q 8	What are the key HSE issues during onshore and offshore blow out situations?	**10**	**CO3**

Q 9	There is always a danger that the drilling mud suddenly has a high hydrogen sulphide content. a. List out the areas with particularly high H_2S risks at drilling rig floor. b. Explain effects of H_2S on personals working at drilling rig site.	**5+5**	**CO2**
SECTION-C (2Qx20M=40 Marks)			
Q 10	The ***Deepwater Horizon*** **oil spill** (also referred to as the **BP oil spill**, **oil leak**, or **oil disaster**; the **Gulf of Mexico oil spill** is an industrial disaster that began on April 20, 2010, in the Gulf of Mexico on the BP-operated Macondo Prospect considered to be the largest marine oil spill in the history of the petroleum industry and estimated to be 8% to 31% larger in volume than the previous largest, the Ixtoc-I oil spill, also in the Gulf of Mexico. After several failed efforts to contain the flow, the well was declared, better than what it was, and sealed on September 19, 2010 Reports in early 2012 indicated that the well site was still leaking. The Deepwater Horizon oil spill is regarded as one of the largest environmental disasters in American history. Explain following – I. The path of tragedy :Background II. What went wrong : investigation III. The consequences : Ecology ,Economics, Litigation, Fisheries etc IV. Long term & short term effects on environment V. What lessons learnt for future: Key recommendations & implementation strategy.	**5x4=20**	**CO4**
Q 11	Original mud weight = 9.6 ppg Measured depth = 10,525 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	**20**	**CO3**

	Leak-off test with 9,0 ppg mud Casing setting depth Shut-in drill pipe pressure Shut-in casing pressure Pit volume gain True vertical depth	= 1130 psi = 4000 ft = 450 psi = 550 psi = 40 bbl = 10,000 ft		
	Use the above data to answer the following questions (A) SURFACE TO BIT STROKES ----------stks (B) BIT TO SHOE STROKES ----------stks (C) BIT TO SURFACE VOLUME ----------bbl (D) KILL MUD WEIGHT ----------ppg (E) INITIAL CIRCULATING PRESSURE ----------psi (F) FINAL CIRCULATING PRESSURE ----------psi (G) MAASP WITH CURRENT MUD WEIGHT ----------psi (H) MAASP AFTER CIRCULATING KILL MUD ----------psi (I) TIME FOR COMPLETE ONE CIRCULATION ----------min (J) PRESSURE DROP PER 100 STROKES ----------psi			

Please detach the Kill Sheet from the question paper, fill it up & tie it with the answer sheet.

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:

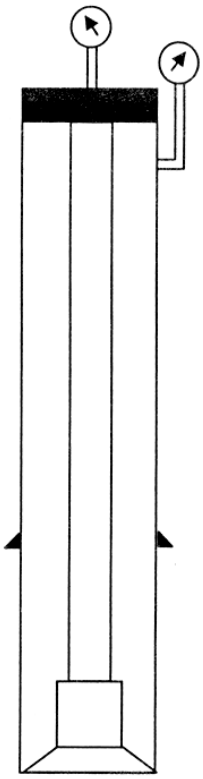
Mud Weight ppg

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	$\frac{\text{(K) x 100}}{\text{(E)}}$ = psi / 100 strokes

Strokes	Pressure