

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Term Examination, December 2022

Programme Name: M Tech (PE)	Semester : I
Course Name : Drilling Engineering	Time : 3 hours
Course Code : PEAU7001	Max. Marks : 100 marks
Nos. of page(s) : 2	

Instructions: All questions are compulsory.

SECTION A

Sl. No.	Question	Marks	CO
Q1.	Draw BOP stack and discuss different types of ram preventers in detail.	4	CO1
Q2.	Discuss the functions of any two components used in BHA.	4	CO2
Q3.	Explain the casing types with their functions.	4	CO2
Q4.	Explain the fundamental working behind the use of KCl polymer mud as a shale inhibitor.	4	CO2
Q5.	Discuss the role and effect of Journal angle while designing a bit; also, mention its optimum range for soft as well as hard formations.	4	CO2

SECTION B

Q6.	Explain the procedure of killing a well a) Driller's Method b) Wait and Weight Method	10	CO4
Q7.	Briefly discuss the types of directional wells along with diagram.	10	CO3
Q8.	<p>The deviated well has an inclination of 30 degree in tangent section and planned mud weight is 11 ppg. Safety factor for this case is 15%. Determine the parameter that provides WOB for drilling mud to keep drill pipe safe from buckling, if WOB desired is 50 klb.</p> <p style="text-align: center;">or</p> <p>An intermediate casing string was cemented using the following muds: first section 7,000 ft was filled by 12.5 lbm/gal mud, second section of 1500 ft was filled by 15.3 lbm/gal mud and the last section was filled by 16 lbm/gal mud. Calculate the total hydrostatic pressure at 11,000 ft. Convert the pressure at 11,000 ft to an equivalent mud weight and determine if it will exceed the fracture gradient of 14.2 lbm/gal. Also calculate the ECD for an annular pressure loss gradient of 0.04 psi/ft and an original mud weight of 13.5 ppg.</p>	10	CO5

Q9.	Illustrate the surface facilities of the mud circulation system with the help of diagram used in a typical land drilling rig	10	CO4
SECTION C			
Q10.	A drill string consists of 600 ft of $8\frac{1}{4}$ in \times $2\frac{13}{16}$ in drill collars and the rest is a 5 in, 19.5lbm/ft Grade X95 drill pipe, weight of drill collar is 161lbm/ft. If the required MOP is 100000 lb and mud weight is 75 pcf (10 ppg), calculate the maximum depth of hole that can be drilled when (a) using new drill pipe and (b) using Class 2 drill pipe having a yield strength (P_t) of 394 600 lb.	20	CO5
Q11.	A kick was detected while drilling a high-pressure zone. The depth of the formation was recorded at 9,000 ft with a mud density of 15.3 ppg. The crew shut-in the well and recorded the pressure for drill pipe and drill collar as 350 psi and 600 psi respectively. The observed total pit gain was 25.0 bbl. The annular capacity against 950 ft of drill collar is 0.0836 bbl/ft and the overkill safety margin is 0.50 ppg. Compute the formation pressure, influx density, the type of fluid, required kill mud weight, and kill mud gradient.	20	CO5