UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B.Tech GSE and B.Tech GIE | **Semester – 3rd**
Subject (Course): Drilling Engineering and Well Completions | **Max. Marks: 100**
Course Code : PTEG211 | **Duration: 3 Hrs**
No. of page/s: 3

SECTION A (5 x 4 = 20 marks)

1. Describe the properties of a completion fluid
2. Explain the term Magnetic Declination. Given Magnetic Declination = 3° West. Measured Azimuth is S 45°W. Calculate the True Azimuth.
3. Mention and explain the indications of a kick.
4. While drilling a section with 80 pcf mud of 10000 ft well. The following data are recorded.
   DPSIP = 300 psi
   CSIP = 500 psi
   Calculate the formation pressure of that section and the kill mud weight.
5. Calculate the dog leg severity if the following data are noted:
   I_1=15˚, I_2=19 ˚ A_1=320 ˚, A_2=310 ˚ and length of interval between the survey points is 200ft.

SECTION B (4x 10 = 40 marks)

6. **Case Study:**
   A well was drilled to hit a target zone at 12000 ft where a huge reserve of gas was anticipated. The well kicks off at a depth of 3000 ft and follows a profile of S type. While drilling at a depth of 2000 ft, the hole got deviated from the vertical profile and somehow the well was bought back to the original position. After achieving the maximum inclination at a depth of 5000 ft the well was locked in till 10000 ft and finally it hits the target at 12000ft successfully.

   Answer the following questions:

   a. Mention the type of BHA that was used at a depth of 2000 ft to bring back the well into its original path. Discuss the working principle.

b. Mention the name of the section describing the length from 3000ft to 5000ft. Name some tools with which this can be achieved.
c. Mention the name of the section describing the length from 10000ft to 12000 ft. Describe the BHA used to achieve this profile.
d. Mention the BHA used to drill the locked in section of this well. Describe the working principle.
e. Given that the locked in section has a severe crooked hole tendency, draw the BHA configuration for achieving a steady hole.

7. Using the graphical method, determine the required orientation of the deflection tool to change the hole direction from N40E to N55E. Assume the hole inclination is 7.5° and maximum dog leg severity is 3°/100ft.
8. Elaborate Lost Circulation. Describe briefly two surveys to detect a lost circulation zone.
9. Describe the procedure for casing seat selection with proper schematic.

SECTION C (2x 20 = 40 marks)

10. Primary Cementing of 7 inch Production Casing:
Hole Depth = 13900 ft
Hole Size = 8 ½ “
Casing shoe = 13891 ft
Mud Weight = 87 pcf
Casing Dimensions = OD/ID = 7 in/6.184in; Grade C95 29#
Cement Details:
Cement Column should be 6562ft long as follows:
From shoe to 656 ft use API Class G cement from 656 ft to 6562 ft use API Class H cement with 2 % Bentonite and 0.3 % HR-4
To prevent contamination of cement by mud 30 bbls of fresh water should be pumped ahead of cement.
Allow 15 mins for plug release
Shoe track : 80ft
Mix cement at 25 sacks/min and displace cement at 300 gpm

	Class G Cement	Class H Cement
Slurry Weight	118 pcf	115 pcf
Slurry Volume	1.15 ft^3/sack	1.22 ft^2/sack
Mix water	5 gal/sack	5.49 gal/sack

Calculate:
a) Quantity of Cement of each class.
b) Volume of Mix Water
c) Total Time for the job
d) Pressure Differential prior to bumping the Plug.
e) Annular Velocity during Chase.

11. During Drilling of an 8.5inch hole at 10,000ft, a kick was encountered. The well was shut in and the pressure recorded on both drillpipe and annulus were:
    DPSIP = 200psi
    CSIP= 400psi

    Other relevant data include:

    Last casing = 9 5/8 inch, N80, 43.5 lbm/ft, ID = 8.755 inch
    Casing Setting Depth= 8600ft
    Drill Collars: 8inch / 3 inch , 500ft
    Drill Pipe = standard D/P
    Circulation pressure (normal) = 2000psi at 60 strokes per minute
    Circulation Pressure at 30 spm = 500 psi
    Present mud weigh = 75 pcf
    Pupm Displacement = 0.1 bbl/stroke
    Casing Burst pressure = 5930 psi

    Draw the trends in standpipe pressure and Casing Pressure vs both time and stroke when used wait and weight method to kill the well.

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