UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Program:B.TECH CSE(O&GI)   Semester – VI

Subject (Course): INTRODUCTION TO DRILLING   Max. Marks   : 100
Course Code   : PTEG 317   Duration   : 3 Hrs
No. of page/s:03

SECTION A: Answer All the Questions.   **(5*4=20Marks).**

1. Differentiate between single stage cementing operation and multi stage cementing operation?
2. Draw the flow diagram of a "Mud Circulation System"?
3. Explain about Top Drive and Kelly Drive?
4. Differentiate between primary, secondary and tertiary well control?
5. Explain in detail about different types of drilling fluids?

SECTION B: Answer All the Questions.   **(5*8=40Marks).**

1. Consider a triplex pump having 6" liners and 11" strokes operating at 120 cycles/min and a discharge pressure of 3,000 psig.
   a)   Compute the pump factor in units of gal/cycle at 100% volumetric efficiency.
   b)   Compute the flow rate in gal/min.
   c)   Compute the pump power developed.

2. A drill string is composed of 7,000 ft of 5-in OD & 4.276 in. ID, 19.5 lbm/ft drill pipe and 500 ft of 8-in. OD by 2.75-in. ID drill collars when drilling a 9.875-in. borehole. Assuming that the borehole remains in gauge, compute the number of pump cycles required to circulate mud from the surface to the bit and from the bottom of the hole to the surface if the pump factor is 0.1781 bbl/cycle.

3. Compute the pump factor in units of barrels per stroke for a duplex pump having 6.5" liners, 2.5" rods, 18" strokes, and a volumetric efficiency of 90%. If the pump is operating at 140 cycles/min, compute the flow rate and the power developed at discharge pressure of 2400 psig.

4. A drilling rig has three diesel engines for generating the rig power requirement. Determine the total daily fuel consumption (in lb./hr.) for an average engine running speed of 900 rpm, average output torque of 1,610 ft-lbs, and engine efficiency of 40%. The heating value of diesel oil is 19,000 BTU/lb.

5. A direct drive rig has a diesel engine which gives an output torque of 1,740 ft-lbf at an engine speed of 1,200 rpm. If the fuel consumption rate was 31.5 gal/hr, what is the output power and overall efficiency of the engine?

TABLE 1.1 – HEATING VALUE OF VARIOUS FUELS

Fuel Type	Density (lbm/gal)	Heating Value (Btu/lbm)
diesel	7.2	19,000
gasoline	6.6	20,000
butane	4.7	21,000
methane	–	24,000

SECTION C: Answer All the Questions.   **(2*20=40Marks).**

1)
 i) Define the following terms   **(8 Marks)**
   a) Well Head.   e) TSP Bits.
   b) H.W.D.P.   f) Blooey Line.
   c) Casing Hanger.   g) Cement Channeling.
   d) Blind RAM   h) Deadline Anchor.

 ii) Explain the different types of casing?   **(8 Marks)**
 iii)   Explain the functions of cement head, wiper plugs and spacer fluids?   **(4 Marks)**

2)
   a) A rig must hoist a load of 300,000 lbf. The drawworks can provide an input power to the block and the tackle system as high as 500hp. Eight lines are strung between the crown block and travelling block. Calculate: **(14 Marks)**
      1)   The static tension in the fast line when upward motion is impending
      2)   The maximum hook horsepower available
      3)   The maximum hoisting speed
      4)   Time required to pull a 90-ft stand
      5)   The actual derrick load
      6)   The maximum equivalent derrick load
      7)   The derrick efficiency factor.

TABLE 1.2 – AVERAGE EFFICIENCY FACTORS FOR BLOCK-AND-TACKLE SYSTEM

Number of Lines (n)	Efficiency (E)
6	0.874
8	0.841
10	0.810
12	0.770
14	0.740

b) Explain the following terms.   **(6 Marks)**
   (i)   Dog leg.
   (ii)   KOP.
   (iii)   Insert bit.
   (iv)   Kelly Cock.
   (v)   Kick
   (vi)   Blowout