ROLL NO.	

PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 40 | Max Time: 120 Mins | Weightage: 40 %

ENDTERM FINAL EXAMINATION

I Semester AY 2017-18 | Course: **PET 211 WELL COMPLETION AND TESTING** | 20 DEC 2017

Instructions:

i. Write legibly
ii. Scientific and non-programmable calculators are permitted
iii. For numerical write the answers up to two decimal points
iv. Use the values given in the graph only.

Part A

[1 Q x 10 M= 10 Marks]

1. Write short notes of the following (any 4; 2.5 marks each)

a. Multilateral Completion

b. Well completion in CO_2 injection well

c. Well completion in Heavy oil reservoir

d. Well completion in CBM wells

e. Well completion in Deep wells

f. Offshore X-Mass tree

g. Corrosion control in Oil industry

Part B

(Any two) **[2 Q x 10 M= 20 Marks]**

2. Derive Partial Differential Equation for a fluid flowing through porous media. Also derive Diffusivity equation from it. What is diffusivity constant?

3. A single phase and single rate pressure build up test was conducted on oil well. the following reservoir parameters are given:

OFVF=1.224 rb/stb

Thickness=55 ft.

Porosity=6%

$C_t=17.5\times10^{-6}Psi^{-1}$

R_w=0.21 ft.

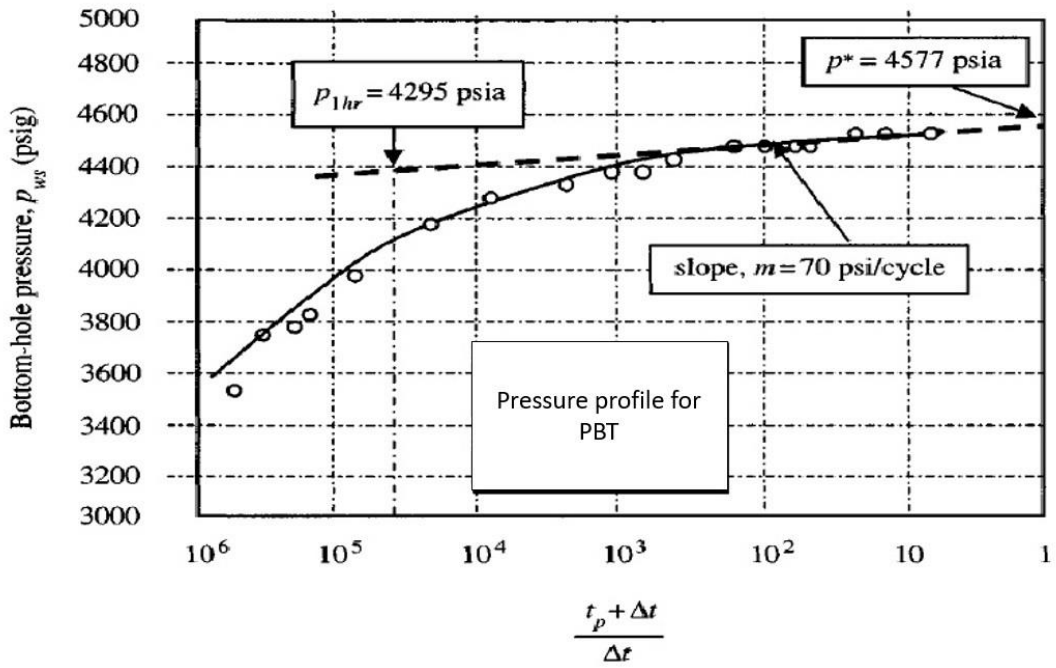
Well depth=4500 ft.

Viscosity of oil=0.65 cP

Effective wellbore radius=1520 ft.

Density of oil=53.5 lb./cf.

Assume the well is draining from the center of a square. Final production rate before shut in=250 bpd and cumulative production at Shut-in time=141979 STB. Pressure at 0 shut in time=3519Psi (a) Pressure profile for the given well is as follows



Determine the following:

i. Permeability of the formation

ii. Skin factor

iii. Pressure drop across skin

iv. Effective well bore radius

v. Flow efficiency of the BHP is equals to 3519 Psi(a)

vi. Damage ratio

vii. Radius of investigation at shut-in time 6 hour and 50 hour

viii. Wellbore storage distortion time if the Wellbore storage constant value is 0.0218

ix. Capacity of the reservoir

4. What is the principle of Pressure draw down test? Draw the flow rate vs. time plot for pressure draw down test. Write two difference between Pressure draw down test and Pressure buildup test.

A single rate flow test was run by stabilizing the flow rate at 105 STB/day for several days. Our pertinent data are:

Thickness=65 ft.

$C_t = 10 \times 10^{-5} Psi^{-1}$

Porosity=10%

Viscosity of oil= 0.75 cP

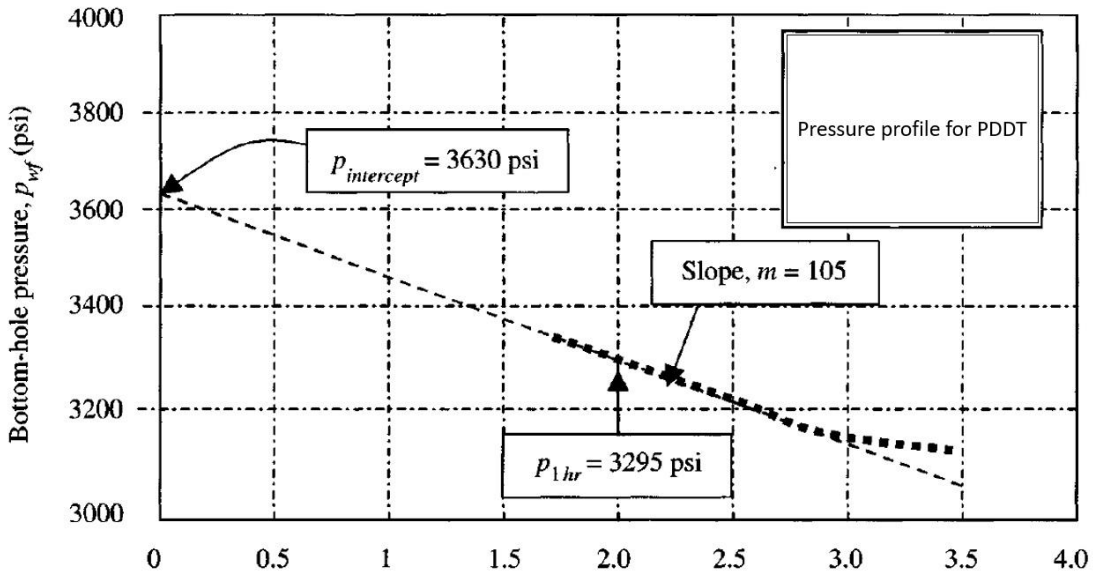
OFVF= 1.75 rb/STB

P_{wf} (At 0 shut in time)=3200 PSi

R_w=0.3 ft.

V_P=3200 Psi

Pressure profile is as follows:



Determine the following:

i. Permeability of the formation

ii. Skin factor

iii. Pressure drop across skin

iv. Apparent well bore radius

v. Flow capacity of the reservoir

Part C

(Any two) **[2 Q x 5 M= 10 Marks]**

5. What is Multi-well testing? What are the two different types of Multi-well testing? What is the main principle behind Multi-well testing? Make comparison between two different types of multi-well testing.

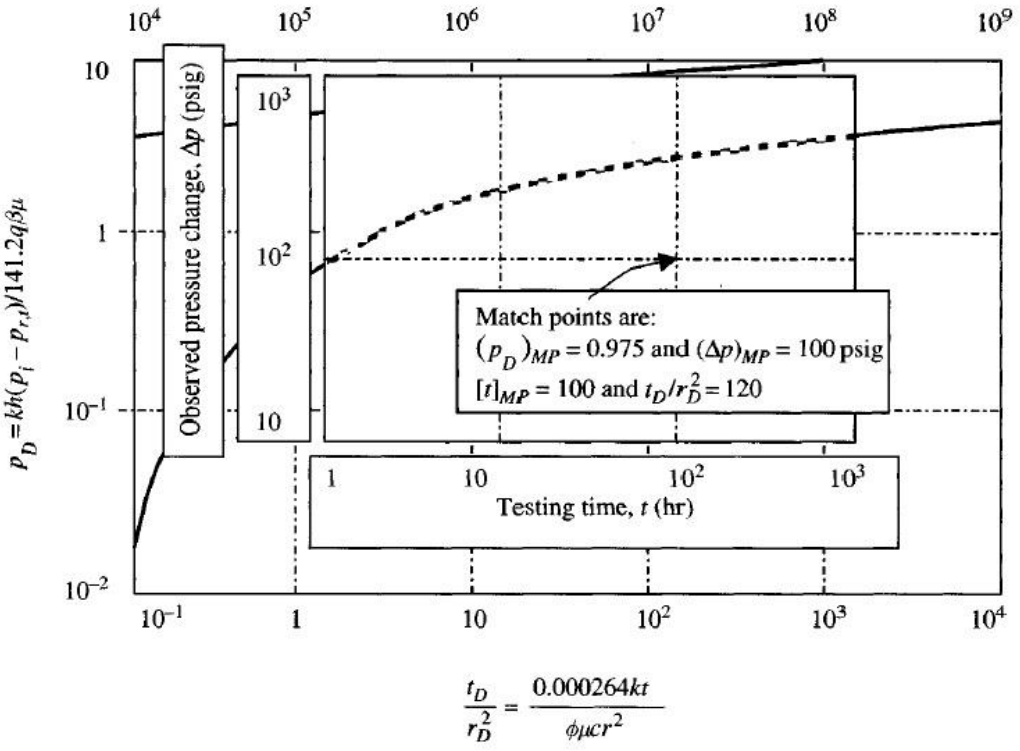
6. Explain the DST plot with a proper diagram.

7. An interference is conducted in an oil well. Water is injected into a well 1 hour 48 hour. The response in Well 2 (65ft) away was observed for 148 hour. From the observed pressure data, Pressure draw down vs. time plot and dimensionless pressure vs. dimensionless time by square of dimensionless radius plot has been prepared. Use type curve matching and find out the Permeability and Porosity of the formation between two wells. Reservoir other properties are given below,

P_i=0 Psig B_o=1.00 rb/STB $c_t = 13.82\times10^{-6}$ Psi^{-1} h=55ft.

t_1=48 hour μ=1.00 Cp q=185 bpd r=80 ft.

Use the graph to find out the values:



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Max Marks: 20 Max Time: 60 Mins Weightage: 20 %

TEST 2

I Semester 2017-2018 Course: **PET 211 WELL COMPLETION AND TESTING** 25OCT 2017

Instructions:

i. Write legibly
ii. Scientific and non-programmable calculators are permitted

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Part A

(2Q x 3 M= 06 Marks)

1. Name the down-hole Well Completion Equipments which will perform the following functions:
   a. Installation of Intermittent Gas lift valves on a tubing just above packer.
   b. Prevention of tubing damage just opposite to Perforation.
   c. Equipment used just above/below any flow control devices.
   d. Injection of corrosion inhibitors into the tubing through annulus.
   e. Maintaining the pressure integrity of the tubing while allowing the string to safely expand or contract.
   f. During a blowout situation if emergency tubing separation above packer is desired.

2. What is shot density? What is the standard *'sdf'* value for a perforation gun having a "shot orientation" of 180^{o}? How Gun clearance affects perforating length?

Part B

(4 Q x 2 M= 8 Marks)

3. What are mud acids? In sandstone formation, why we cannot use HF directly to treat the formation?

4. Explain- *"Sand control techniques are necessary evil."*

5. Write down the name of two explosive use in an Oil well perforation. What are the different types of Perforation gun system?

6. What is the propagation direction of a fracture? Write down the names of two different 2D models to describe fracture geometry. Also mention their fracture half-length and height relationship.

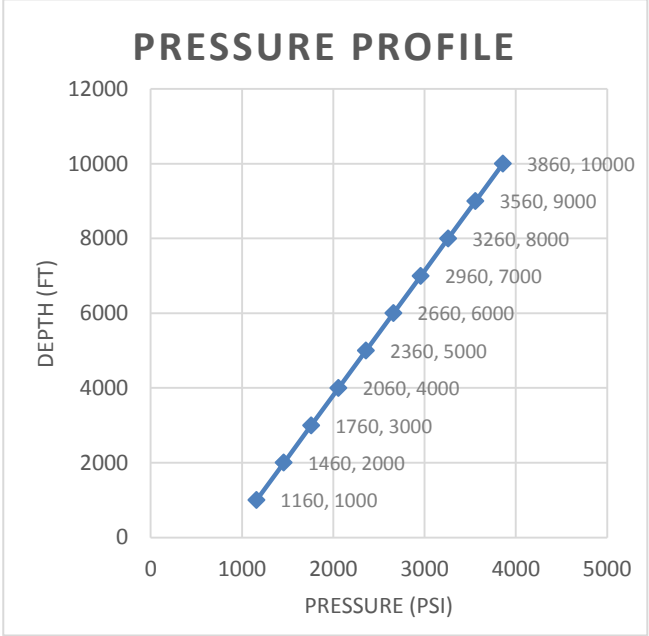
Part C

(3 Q x 2 M= 6 Marks)

7. In a laboratory analysis of a core sample from a Sandstone formation, it was found that permeability of the core sample was 100(mD). During drilling operation due to the invasion of bentonite filtrate, pore throats were blocked leading to a reduction of formation permeability. Now this new permeability in the near well-bore formation is 10(mD). If the wellbore radius is 5ft and the Skin factor of the damage zone is (+) 6, Find out the extent of this damage zone. (Given $1mD=10^{-15}m^{2}$)

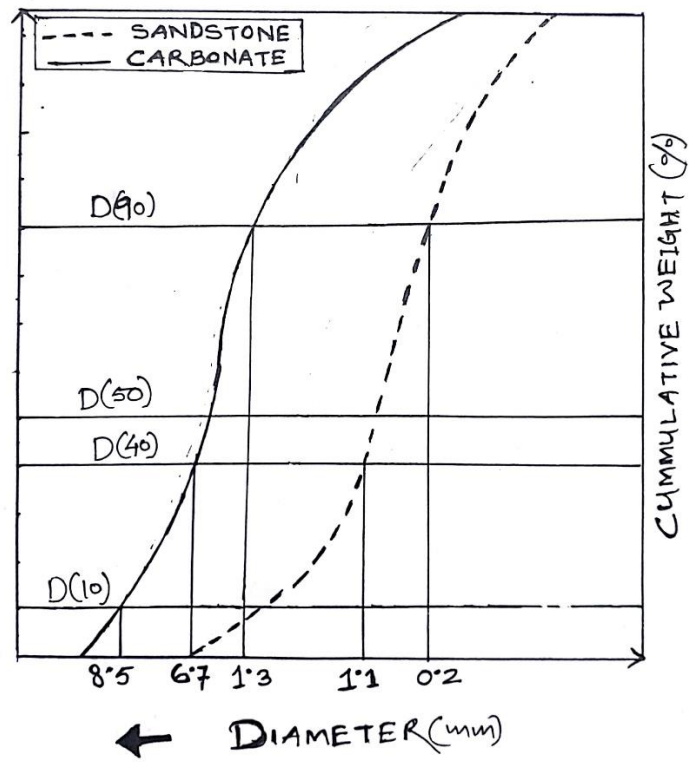
8.

A sandstone formation has a Poison's ratio of 0.25 and Poro-elastic constant value 0.72. The average density of the overburden formation is 150 pcf. Assume that tectonic stress is 1500 Psi and a tensile strength is 1000Psi. If the hydro-fracturing depth is 10000ft then Predict the breakdown pressure for the sandstone. (Pressure profile upto the final depth, where we want to do hydro-fracturing is given)



9.

Using the "Exceeding Curve", find out the Uniformity constant for Carbonate formation. Also characterize the formation.



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Max Marks: 20 | Max Time: 60 min | Weightage: 20 %

TEST 1

I Semester 2017-2018 | Course: **PET 211 WELL COMPLETION AND TESTING** | 20 SEPT 2017

Instructions:

i. Write legibly
ii. All questions are mandatory
iii. For Question number 13 find the values from the table only.
iv. Write the answers upto two decimal points.

Part A

(7Q x 1 M= 07 Marks)

1. What is the definition of "Well completion"?
2. What is the purpose of an "Appraisal well"?
3. Write down the names of two Well completion service providers.
4. Write down two interphase problems in an Oil and Gas field.
5. Write down the number of threads present in two different types of API connection for a tubing?
6. How ID of casing string is important for selection of packer?
7. What is the function of "NASA"?

Part B

(4Q x 2 M= 08 Marks)

8. Write two draw backs of 'Barefoot' Completion.
9. What are different procedures we need follow to OPEN a Xmas tree?
10. Draw the different options of *flow conduit* between reservoir and surface.
11. Write down two characteristics of Packer Fluid.

Part C

(2 Q x 2.5 M= 05Marks)

12. Find out the change of length of a 5.5" × 4" tubing having an air weight 17ppf. Given that length of tubing is 609.6 meter and well is filled with Brine which has a Specific gravity 1.02. (Specific Gravity of steel=7.85)

θ = 30000000 Psi, Where θ is the slope of Stress vs Strain graph

13. Find out the axial strength of the tubing with dimensions $3^{1}/_{2}$" , 7.7 ppf, J55 with NON-UPSET (USE TABLE 1)

Table1: API Specification for different types of Tubing

OD	NOMINAL WEIGHT (ppf)		GRADE	WALL THICKNESS	ID	COLLAPSE RESISTANCE	INTERNAL YIELD STRENGTH	JOINT YIELD STRENGTH
(inch)	NON UPSET	UPSET		(inch)	(inch)	(Psi)	(Psi)	(Psi)
$3\,1/2$	7.7	9.3	H-40	0.216	3.068	4630	4320	65070
$3\,1/2$	9.2	9.3	H-40	0.254	2.992	5380	5080	79540
$3\,1/2$	10.2	9.3	H-40	0.289	2.992	5780	5780	92550
$3\,1/2$	7.7	9.3	J-55	0.215	3.068	5970	5940	89470
$3\,1/2$	9.3	12.5	J-55	0.289	2.922	7400	6990	127250
$3\,1/2$	10.2	12.5	J-55	0.289	2.922	8330	7950	127250
$3\,1/2$	7.7	12.5	C-75	0.216	3.068	7540	8100	122010
$3\,1/2$	10.2	12.5	C-75	0.289	2.922	11360	10840	173530
$3\,1/2$	12.7	12.95	C-75	0.375	2.750	14350	14060	230990
$3\,1/2$	7.7	12.95	N-80	0.216	3.068	7870	8640	130140
$3\,1/2$	10.2	12.95	N-80	0.289	2.922	12120	11560	185100
$3\,1/2$	12.7	12.95	N-80	0.375	2.750	15310	15000	246390
$3\,1/2$	9.2	9.3	P-105	0.254	2.992	13050	13340	208800
$3\,1/2$	12.7	12.95	P-105	0.374	2.750	20090	19390	323390