

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2020

Programme Name: B.Tech APE Upstream

Semester : VI

Course Name : Well Testing and Well Stimulation

Time : 03 hours

Course Code : PEAU 3021

Max. Marks: 100

Instructions :

- All questions are compulsory. However, internal choice has been provided. You have to attempt only one of the alternatives.
- Write the answers on an A4 sheet with your name and roll number mentioned on each page. Pl scan properly so as the answers are visible.
- Submit well within time limit.

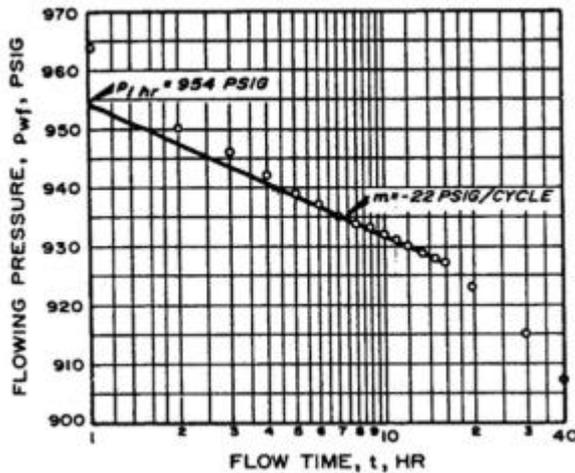
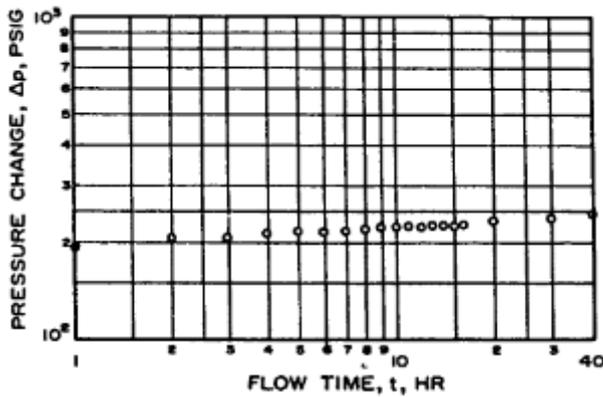
SECTION A

(5 x 6 marks = 30 marks)

S. No.		Marks	CO
1	Elaborate significance of invaded, uninvaded and flash zone of different depths of Investigations in borehole environment.	5	CO1
2	Write short note on Horner's plot.	5	CO3
3	a) Stimulation is the opening of new channels in the rock for oil and gas to flow through easily. T/F b) The acid solution helps dissolve this calcareous mixture, opening the channels of the well and restoring the flow of oil. T/F	5	CO4
4	Describe the 2 stages of Hydraulic fracturing.	5	CO4
5	Which of the following is correct for proppants? a) Used in hydraulic fracturing b) Used to close the fracture c) Used in oil well only d) Used in gas well only In which of the following case the pressure of the pumping fluid is greater than fracturing fluid a) Acid fracturing b) Hydraulic fracturing c) Matrix Acidizing d) All of the above.	5	CO4
6	a) At times between the end of the transient region and the beginning of the pseudo steady-state region there is a transition region called _____. b) Diffusivity equation is obtained by combining the laws of _____, _____ and _____. c) _____ often involve the use of a solution of water and HCL (hydrochloric acid) that is pumped into the well to dissolve minerals and composites blocking the channels such as calcium carbonate.	5	CO2

SECTION B
(50 marks)

Q 2	<p>A well and reservoir have the following characteristics: The well is producing only oil; it is producing at the constant rate of 20 STB/D. Data describing the well performance are</p> <p>porosity = 0.72 cp, $k = 0.1$ mD</p> <p>$C_t = 1.5 \times 10^{-5}$ psi-I</p> <p>$P_i = 3,000$ psia,</p> <p>$R_e = 3000$ ft,</p> <p>$R_w = 0.5$ ft,</p> <p>$B_0 = 1.475$ RB/STB,</p> <p>$h = 150$ ft</p> <p>porosity = 0.23 and $s = 0$</p> <p>Calculate the reservoir pressure at the radius of 1 ft after 3 hours of production; then, calculate the pressure at radii of 10 and 100 ft after 3 hours of production.</p>	10	CO2
Q 3	<p>A flowing well is completed in a reservoir that has the following properties. (5 marks)</p> <p>$\mu = 0.44$ cp, $k = 25$ mD</p> <p>$C_t = 18 \times 10^{-6}$ psi-I</p> <p>$P_i = 2500$ psia,</p> <p>$B_0 = 1.4$ RB/STB,</p> <p>$h = 43$ ft</p> <p>$\phi = 0.16$</p> <p>What will the pressure drop be in a shut-in well 500 ft from the flowing well when the flowingwell has been shut-in for 1 day following a flow period of 5 days at 300 STB/D.</p>	10	CO2
Q 4	Enumerate the reasons of well stimulation.	10	CO4
Q5	<p>Describe the following:</p> <p>a) Matrix acidizing</p> <p>b) Acid Fracturing</p>	10	CO4
Q6	Estimate oil permeability and skin factor from the draw down data of given figures: log-log and semi-log plots.	10	CO3



Known reservoir data are:-

$h = 130 \text{ ft}$ $\phi = 0.20$
 $r_w = 0.25 \text{ ft}$, $p_i = 1154 \text{ psia}$
 $q_o = 348 \text{ STB/D}$ $m = -22 \text{ psi/cycle}$
 $B = 1.14 \text{ RB/STB}$ $\mu = 3.93 \text{ cp}$
 $p_{1hr} = 954 \text{ psi}$ $C_t = 8.74 \times 10^{-6} \text{ psi}^{-1}$

SECTION-C
(20 marks)

Q7 Describe the various steps of hydraulic fracturing design.

Or

A sandstone at a depth of 10,000 ft has a Poisson's ratio of 0.25 and a poro-elastic constant of 0.72. The average density of the overburden formation is 165 lb=ft³. The pore pressure gradient in the sandstone is 0.38 psi/ft. Assuming a tectonic stress of 2,000 psi and a tensile strength of the sandstone of 1,000 psi, predict the breakdown pressure for the sandstone.

20

CO4