

كلية الهندسة  
قسم هندسة النفط  
الزمن : ثلاث ساعات  
أستاذ المقرر: أ. وليد بن صالح  
رقم الطالب:

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اسم الطالب:

Notes: (امتحان كتاب مفتوح، مسموح للطالب استعمال كل ما يلزم)

1. It's an Open Book exam; you are allowed to use all relevant materials.
2. Hand in your exam paper along with your answer paper.

**Question 1: (15 points).**

Using the gas composition given below, and assuming real gas behavior, calculate:

1. Gas density at 2000 psia and 150°F
2. Gas formation volume factor in ft<sup>3</sup>/scf at 2000 psia and 150°F
3. Gas viscosity at 2000 psia and 150 °F

Component	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	n-C <sub>4</sub>	n-C <sub>5</sub>
Mole Fraction	0.65	0.15	0.10	0.06	0.04

**Question 2: (15 points).**

A 20 API oil has a saturation pressure of 2000 psia. If the reservoir temperature is 100 F ;

1. estimate the viscosity of oil at 2000 psia, 1000 psia, 500 psia
2. Construct a viscosity verses pressure curve.

**Question 3: (15 points).**

You are producing a 35°API crude oil from a reservoir at 5000 psia and 140°F. The bubble-point pressure of the reservoir liquids is 4000 psia at 140°F. Gas with a gravity of 0.7 is produced with the oil.

Using any available correlation, calculate the following:

1. Density of the oil at 5000 psia and 140°F
2. Total formation volume factor at 5000 psia and 140°F

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**Question 4: (15 points)**

Given bellow the laboratory data

1. Evaluate  $R_{so}$ ,  $B_o$  and  $B_t$  at each pressure.

Cell Pressure psia	Oil Volume in Cell (cc)	Gas Volume in Cell (cc)	Gas Compr. Factor (Z)	Cell Temperature (°F)
2000	650	0		195
1500 = $P_b$	669	0		195
1000	650	150	0.91	195
500	615	700	0.95	195
14.7	500	44,500		60