

Introduction to Energy Resources
(자원공학개론) (38523)

- 2020 Midterm Examination -

Student ID:

Name:

Notice

- Fill your name in the following:

*“I, _____, swear I solve all problems by myself in this midterm examination.
I will take any disadvantages if any dishonesty such as cheating is acted on my solution.”*

5 points will be deducted from your total score if you do not fill in your name above.

Problem 1.

For the sub-problems from 1-1 to 1-4, give the full names of the following abbreviations:

- 1-1. SCAL [2 pts.]
- 1-2. API [2 pts.]
- 1-3. STP [2 pts.]
- 1-4. EUR [2 pts.]
- 1-5. Describe the standard conditions in petroleum engineering [2 pts.]

Problem 2.

Calculate the API gravity of oil to the first decimal place [5 pts].

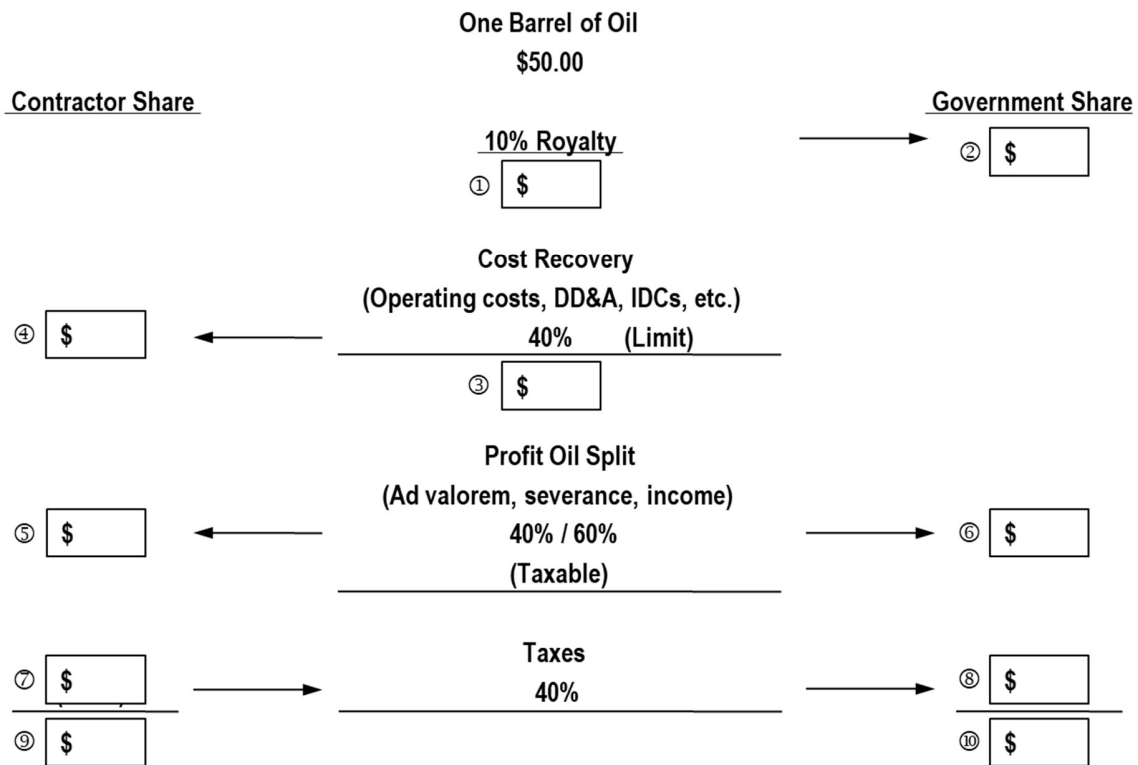
Here, oil density is 750 kg/m^3 and water density is $1,000 \text{ kg/m}^3$.

Problem 3.

Explain casing (e.g., role, type, how to install a casing, etc.) during drilling with at least 20 keywords. You will earn 1 point from each keyword if the keyword is appropriate. You MUST number each keyword in your answer notes [20 pts.].

Problem 4.

Below is an example of production sharing contract (PSC). Oil price is assumed as \$50 per stock tank barrel. Fill in the blanks from ① to ⑩ [10 pts.].



Problem 5.

About the energy mix in the Asia Pacific region, list the six energy types (i.e., Coal, Hydroelectricity, Natural Gas, Nuclear Energy, Oil, and Renewables) in descending order of their proportions. Note that the answer of this problem is based on the BP Statistical Review of World Energy 2020 [5 pts.].

_____ > _____ > _____ > _____ > _____ > _____

Problem 6.

Draw a graph of the oil and gas window and explain how and where petroleum is formed [10 pts.].

Problem 7.

Explain the main difference among primary, secondary, and tertiary oil recovery techniques [15 pts.].

Problem 8.

Prove that the maximum porosity of clean sandstone is 47.6%, approximately [5 pts.].

If needed, let π be 3.14 and $\sqrt{2}$ be 1.41.

Problem 9.

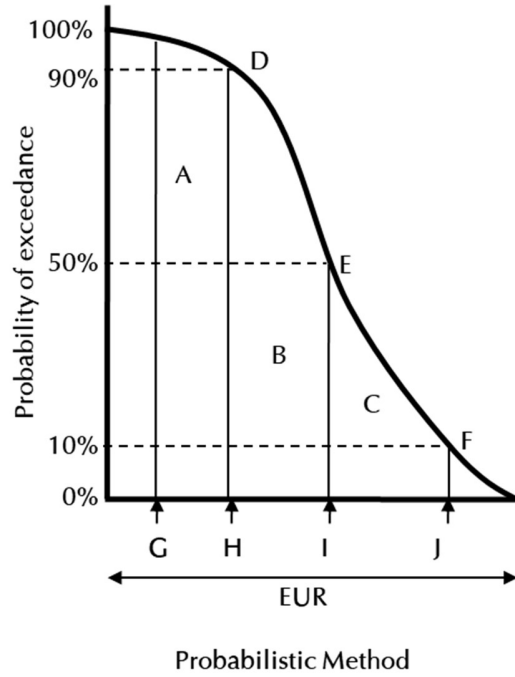
Derive the following formula:

$$C_b = \phi C_f + (1 - \phi)C_m ,$$

where C_b is the bulk compressibility, ϕ is the porosity, C_f is the pore compressibility, and C_m is the matrix compressibility [10 pts.].

Problem 10.

Below is a graph for reserve estimation based on a probabilistic method. Provide appropriate names from A to J. [15 pts.].



----- This is the End of the Midterm Examination -----