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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B. Tech (Geo Informatics Engineering) &
B. Tech (Geo Science Engineering)

Subject (Course): Principles of Reservoir Engineering

Semester – VII

Course Code : PTEG334

Max. Marks : 100

No. of page/s: 2 (Two)

Duration : 3 Hrs

THIS PAPER CONTAINS 3 (THREE) SECTIONS, ALL THE SECTIONS ARE COMPULSORY

(Assume any missing value)

SECTION - A

There are Five (05) questions of 4 marks each. All questions are compulsory

Question-1

Describe the objectives of Petroleum Resources Management System

Question-2

Differentiate between Reserves and Resources with reference to uncertainty in oil industry.

Question-3

Express the concept of LKH (Lowest known hydrocarbon) and the possible flexibilities existing in oil industry from resource/reserve description point of view.

Question-4

What are the three basic questions that need to be addressed before taking reserve/resource estimations?

Question-5

Differentiate the various stages of reserve estimations along with their specific objectives. Also discuss the principle of volumetric estimations of oil reservoirs and the source of basic data availability.

SECTION - B

There are four(04) questions of 10 marks each. All questions are compulsory

Question-6

Estimate Volume of oil in place in standard condition **for** an oil reservoir that has following the reservoir properties:

- (i) Volume of reservoir rock = $1.96 \times 10^9 \text{ m}^3$ (ii) Useful thickness/total thickness = 0.85
(iii) Porosity $\Phi = 18\%$ (iv) Saturation $S_{wi} = 25\%$ (v) FVF of oil = 1.34

Continued on Page-2

Question-7

Discuss the concept, assumptions and basic features of oil material balance equation. Also describe its limitations.

Question-8

What do you understand by the term- “Total Formation Volume Factor? Discuss its role in application of Material Balance Equation.

Question-9

- (a) What is the objective of Enhanced Oil Recovery? Describe the role of displacement efficiency and sweep efficiency in the reduction of residual oil saturation.
- (b) An oil reservoir has the irreducible saturation value as 20%. During the screening of EOR its core flood has indicated the reduction of ROS from 25% to 15%. Will there be any additional oil recovery? If so, please quantify the same.

SECTION – C

There are (02) questions of 20 marks each. All questions are compulsory

Question-10

Write the your views about any two of the following topics:

1. Plannimetry
2. R/P Ratio
3. Reservoir pressure systems

Question-11

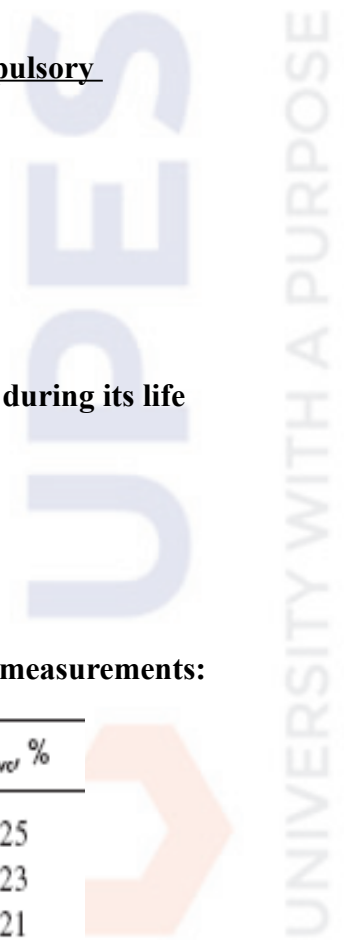
Discuss the importance of state of equilibrium in reservoir fluid movement during its life cycle and significance of following equations:

$$S_o = \frac{\sum_{i=1}^n \phi_i h_i S_{oi}}{\sum_{i=1}^n \phi_i h_i} \quad S_w = \frac{\sum_{i=1}^n \phi_i h_i S_{wi}}{\sum_{i=1}^n \phi_i h_i} \quad S_g = \frac{\sum_{i=1}^n \phi_i h_i S_{gi}}{\sum_{i=1}^n \phi_i h_i}$$

OR

Calculate the average oil and connate water saturation from the following measurements:

Sample	h _i , ft	φ, %	S _{oi} %	S _{wci} %
1	1.0	10	75	25
2	1.5	12	77	23
3	1.0	11	79	21
4	2.0	13	74	26
5	2.1	14	78	22
6	1.1	10	75	25



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SECTION - A

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Question-1

What is included in Guidelines for application of the Petroleum Resource Management System?

Question-2

Differentiate between Contingent and Prospective Resources.

Question-3

Differentiate between Risk & Uncertainty in oil industry from reserves and production point of view.

Question-4

“The reserve Estimation is a dynamic exercise in oil industry” Indicate the key aspects related to the statement.

Question-5

Differentiate the various stages of reserve estimations and their aspects of application.

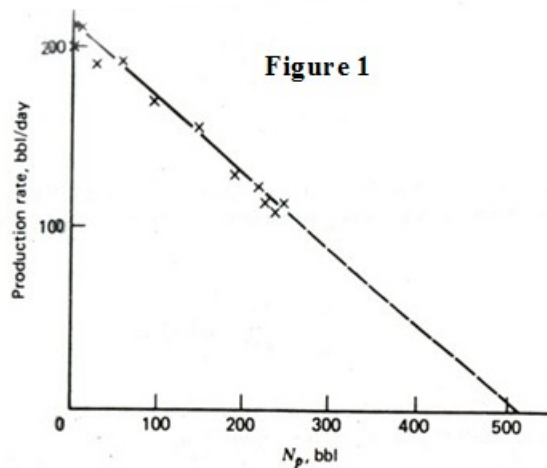
SECTION – B

There are four(04) questions of 10 marks each. All questions are compulsory

Question-6

Define the Economic Limit Rate and its implications in oil industry. Also from the Rate Cumulative Graph of a well given in Figure 1 (below), calculate the following:

- Find the production(N_p) till the economic limit of 50bbl/day
- In place reserves and the future production if present production is 250,000 bbl

**Question-7**

Terms and symbols used in Oil MBE may be explained:

- p_b Bubble point pressure, psi
- N Initial (original) oil in place, STB
- G_p Cumulative gas produced, scf
- W_p Cumulative water produced, bbl
- R_p Cumulative gas-oil ratio, scf/STB

Question-8

Describe the conditions under which following equation may be used as straight line equation to indicate different primary drive mechanisms of an oil reservoir:

$$F = N E_o + N m \frac{B_{ti}}{B_{gi}} E_g + C \Delta p Q (\Delta t_D)$$

Question-9

What is the purpose of Enhanced Oil Recovery? Describe the role of displacement efficiency and sweep efficiency in the reduction of residual oil saturation.

An oil reservoir has the irreducible saturation value as 20%.

During the screening of EOR its core flood has indicated the reduction of ROS from 25% to 15% . Will there be any additional oil recovery? Please quantify the same.

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B. Tech VII

 -3

SECTION – C

There are (02) questions of 20 marks each. All questions are compulsory

Question-10

“Reservoir monitoring is the vital part of oil industry that contribute towards energy security”

Discuss the above statement with respect to key elements of Reservoir Monitoring - being described in terms of:

- (i) Traditional Problems,
- (ii) Current Approach and
- (iii) Related Challenges.

Question-11

Write the views about any two of the following two topics:

- 4. Plannimetry.
- 5. R/P Ratio.
- 6. Reservoir pressure systems.

END OF PAPER-2

