

كلية الهندسة
قسم هندسة النفط
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ملاحظات: الرجاء تسليم ورقة الامتحان مع كراسة الاجابة

Question 1: (20 Points).

A. Answer the following:

- 1) In a flow chart scheme, explain the process of reservoir simulation.
- 2) On what basis are numerical reservoir simulator classified? Clarify.
- 3) List the data needed for a black oil simulator. Give one example for each type.
- 4) Explain how numerical simulators can be abused?

B. According to your classification in part A (2) what type of simulator would you recommend for the following case studies:

- 1) A five spot water injection project
- 2) CO₂ injection project
- 3) Steam Injection project
- 4) Polymer injection project
- 5) Miscible gas injection project.
- 6) Immiscible gas injection project
- 7) In-situ combustion project.

C. What does IMPES, fully Implicit, fully explicit reservoir simulator mean?

Question 2: (15 points).

A. Given below is the general material balance equation for oil and gas reservoirs:

$$F = N(E_o + mE_g + E_{fw}) + W_e$$

$$F = G(E_g + E_{fw}) + W_e$$

For each type of reservoir and using the equation of a straight line method Explain how to calculate the Initial oil/gas in place in case:

- 1) There's a water drive associated.
- 2) There's NO water drive associated.

B. List the most common decline curves used for oil reservoirs

Question 3: (10 Points)

- A. How can a reservoir management plan be implemented?
- B. Integration of geoscience and engineering depends on what points.
- C. What does stochastic modeling of geological data mean? How does that help reservoir management?

Question 4: (15 points).

- A. List the different methods used to assess reservoir performance.
- B. List all the factors that influence reservoir performance.
- C. On a *GOR VS Time* graph and *Reservoir Pressure Vs Time* graph, show the characteristics of each the following drive mechanisms:
 - i. Water Drive
 - ii. Solution gas drive
 - iii. Gas Cap drive