

أجب عن جميع الأسئلة الآتية

- Q1/ i) What is the Defining Enhanced Oil Recovery (EOR)? 3Mark
 ii) What is the Effects of Microbial EOR: 3 Mark
 iii) Heat at an amount of 15×10^6 Btu/hr is injected as wet steam into a formation 77 ft thick for a period of 450 days followed by cold water injection for another 450 days. **Calculate the vertical heat loss to adjacent strata.** Using WILLMAN.ET.AL Curve
 Thermal diffusivity = $0.94 \text{ ft}^2/\text{dat}$.

6Mark

- Q2/ i) Describe cyclic steam injection and explain when and why the process results in higher oil rates and also high recoveries. 3Mark

3Mark

- ii) Assuming the formation temperature 100°F , steam quality is 65% and steam injection, the wet steam enthalpy is 1000 Btu/lbm and water enthalpy at 100°F 69.7 Btu/lbm, and steam injection rate is 960 bbl/day steam loss 0.45 and steam temperature 515°F , heat capacity of the rock is $34 \text{ Btu}/\text{ft}^3 \cdot ^\circ\text{F}$, formation thickness 65 ft. Where $C = 350 \text{ lbm}/\text{bbl}$
Calculate: the heated radius.

6Mark

- Q3/ i) What is the Thermal recovery process? 3Mark

3Mark

- ii) Steam generators are used to inject 1380 bbl/day wet steam having 70 percent quality at 1200 psia sand-face pressure into a formation 65 ft thick. Assuming radial and uniform propagation of heat, **Calculate the oil displaced by steam drive and the cumulative heated area if the injection period in five (5) years.**

The reservoir rock characteristics are as follows:

$$\phi = 25\% \quad S_o = 65\% \quad S_{or} = 17\% \quad T_{\text{initial Res. Temp}} = 162.24^\circ\text{F}$$

$$M_s = 32 \text{ Btu}/\text{ft}^3 \cdot ^\circ\text{F} \quad D = 0.72 \text{ ft}^2/\text{day} \quad K = 0.95 \text{ Btu}/\text{ft} \cdot \text{hr} \cdot ^\circ\text{F}$$

$$h_{\text{water}} = \text{enthalph of water @ initial res. Temp} = 1001 \text{ Btu}/\text{lb}_m$$

10Mark

- Q4) i) What is the problems of carbon dioxide in the enhanced oil recover? 3Mark

3Mark

- ii) Calculate the final oil recovery factors at a water oil ratio 1, 5, 25 and 100, expected through conventional water injection and polymer water flooding.

plot WOR Vs. recovery factor.

Irreducible water saturation = 25%

Relative permeability for water = 0.20

Relative permeability for oil = 0.58

Water viscosity = 1 cp

Oil Viscosity = 7 cp

Permeability variation = 0.60

Formation Volume factor for oil = 1.05 RBLL/STB

Resistance factor = 6

10Mark

- Q5) i) What is the Mechanism: In-situ combustion? 3 Mark

3 Mark

- ii) Calculate the final oil recovery factors at a water oil ratio 1, 5, 25 and 100, expected through conventional water injection using Johnson's curves.

At S_{wi} and S_{or} and S_{wc}

primary Recovery = 10%

Water viscosity = 1 cp

Oil Viscosity = 7 cp

Permeability variation = 0.30

Formation Volume factor for water = 1.05 RBLL/STB Resistance factor = 6

Formation Volume factor for oil = 1.15 RBLL/STB

10 Mark