1. Determine the pressure at the head of injection well if the well has a depth of 2600 m for pumping 210 m^3/day of water into the reservoir for the data: formation pressure is 24.0 MPa and the acceleration coefficient (productivity coefficient) is 10 m^3/day·MPa.

H=2600 m

Q=210 m^3/day

P_f=24 MPa

K_o=10 m^3/day·MPa

Pwh-?

$$P_{bh} = P_f + \frac{Q}{K_o}$$

$$P_{bh} = \rho_w \cdot g \cdot H + P_{wh} - \Delta P_{loss}$$

$$P_f + \frac{Q}{K_o} = \rho \cdot g \cdot H + P_{wh}$$

$$P_{wh} = P_f + \frac{Q}{K_o} - \rho \cdot g \cdot H$$

$$P_{wh} = 24 \cdot 10^6 + \frac{210 \cdot 86400 \cdot 10^6}{86400 \cdot 10} - 1000 \cdot 9.81 \cdot 2600 = 19.5 \cdot 10^6 \text{ Pa}$$

2. Determine injection pressure to be created for pumping 250 m^3/day of water into the well to the depth of 1800 m, if the pressure in the injection line is 18 MPa. The distance between the wells - 800 m; radius of wells 0.1 m, the coefficient of permeability $0{,}1 \cdot 10^{-13}$ m^2 . Layer thickness is – 18 m.

Q=250 m^3/day

H=1800 m

$P_{injline}$=18 MPa

2σ=800 m

r_w=0.1 m

k=$0{,}1 \cdot 10^{-13}$ m^2

h=18m

$$Q = \frac{2 \cdot \pi \cdot k_w \cdot h \cdot (P_{bhinj} - P_{injline})}{\psi \cdot \mu_w \ln \frac{\sigma}{\pi \cdot r_w^{\,2}}}$$

$$P_{bhinj} = \frac{Q \cdot \psi \cdot \mu_w \ln \frac{\sigma}{\pi \cdot r_w^{\,2}}}{2 \cdot \pi \cdot k_w \cdot h} + P_{injline}$$

$$P_{bhinj} = \frac{\frac{250}{86400} \cdot 1 \cdot 1 \cdot 10^{-3} \cdot \ln \frac{400}{3.14 \cdot 0.1^2}}{2 \cdot 3.14 \cdot 0.5 \cdot 0.1 \cdot 10^{-13} \cdot 18} + 18 \cdot 10^6 = 66.39 \cdot 10^6 \text{ Pa}$$