

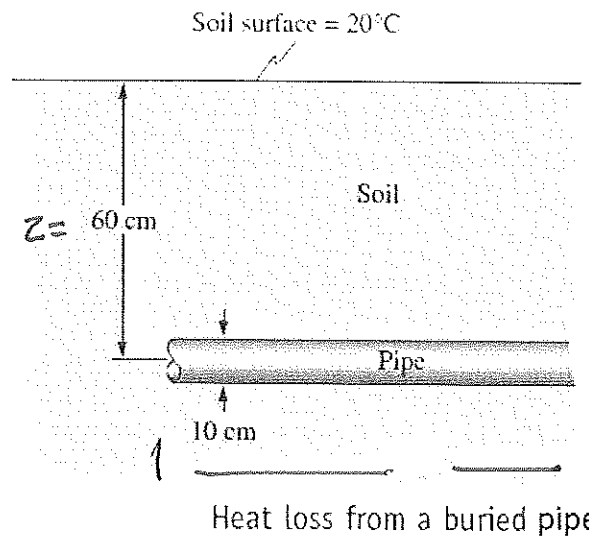
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FACULTY OF ENGINEERING  
MECHANICAL ENGINEERING DEPARTMENT

ME 313 HEAT TRANSFER

FALL 2016

QUIZ on CH 4

A long, 10-cm-OD pipe is buried with its centerline 60 cm below the surface in soil having a thermal conductivity of 0.4 W/m K, as shown in Figure given below. Calculate the heat loss per meter length if the pipe surface temperature is 100°C and the soil surface is at 20°C.



long cylinder

$$S = \frac{2\pi}{\cosh^{-1}\left(\frac{2z}{D}\right)}$$

$$q = kS\Delta T$$

$$S = \frac{2\pi}{\cosh\left(\frac{2 \times 60}{10}\right)} = 1.98$$

$$q = (0.4)(1.98)(100 - 20) = 63.4 \text{ W/m}$$