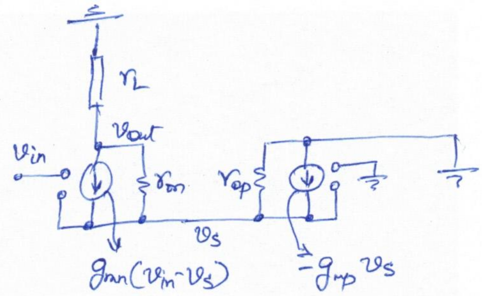
(1) The small signal model for this problem is shown on the right.



Performing nodal analysis,

$$-\frac{v_{out}}{r_L} = g_{mn}(v_{in}-v_s) + \frac{v_{out}-v_s}{r_{on}} = \frac{v_s}{r_{op}} + g_{mp}v_s .$$

$$\Rightarrow \left(g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}\right)v_s = g_{mn}v_{in} + \frac{v_{out}}{r_{on}}$$

$$\Rightarrow v_s = \frac{g_{mn}v_{in}+\frac{v_{out}}{r_{on}}}{g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}} = \frac{-\frac{v_{out}}{r_L}}{g_{mp}+\frac{1}{r_{op}}} \Rightarrow v_{out}\left[\frac{g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}}{r_L} + \frac{g_{mp}+\frac{1}{r_{op}}}{r_{on}}\right] + g_{mn}v_{in}\left(g_{mp}+\frac{1}{r_{op}}\right) = 0.$$

$$\Rightarrow \frac{v_{out}}{v_{in}} = \boxed{\frac{-g_{mn}\left(g_{mp}+\frac{1}{r_{op}}\right)}{\left(g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}\right)\frac{1}{r_L} + \left(g_{mp}+\frac{1}{r_{op}}\right)\cdot\frac{1}{r_{on}}}} = \boxed{-\frac{100}{26}}.$$

For the output impedance, set $v_{in}=0$, ~~r_L~~ remove r_L and apply a test current:

$$i_{test} = -\left(g_{mn}+\frac{1}{r_{on}}\right)v_s + \frac{v_{out}}{r_{on}} = \left(g_{mp}+\frac{1}{r_{op}}\right)v_s \Rightarrow v_s = \frac{\frac{v_{out}}{r_{on}}}{g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}}$$

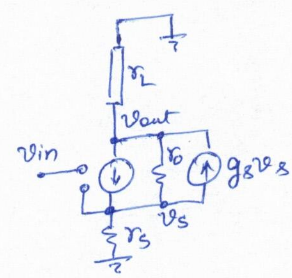
$$\Rightarrow i_{test} = \frac{v_{out}\left(g_{mp}+\frac{1}{r_{op}}\right)\frac{1}{r_{on}}}{g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}} \Rightarrow r_{out} = \frac{v_{out}}{i_{test}} = \boxed{\frac{g_{mn}+g_{mp}+\frac{1}{r_{on}}+\frac{1}{r_{op}}}{g_{mp}+\frac{1}{r_{op}}}\cdot r_{on}} = \boxed{125\,k\Omega}.$$

(2) The small signal model for this problem is shown to the right.

Performing nodal analysis, $-\frac{v_{out}}{r_L} = g_m(v_{in}-v_s) + \frac{v_{out}-v_s}{r_o} - g_s v_s = \frac{v_s}{r_s}$.

$$\Rightarrow v_s = -\frac{r_s}{r_L}v_{out},\quad g_m v_{in} + v_{out}\left[\frac{1}{r_o}+\frac{1}{r_L}+\left(g_m+g_s+\frac{1}{r_o}\right)\frac{r_s}{r_L}\right] = 0 \Rightarrow \frac{v_{out}}{v_{in}} = \boxed{\frac{-g_m r_o r_L}{r_o+r_L+[1+(g_m+g_s)r_o]\,r_s}} = \boxed{\frac{-10^4}{377}}.$$

For the output impedance, $i_{test} = -g_m v_s + \frac{v_{out}-v_s}{r_o} - g_s v_s = \frac{v_s}{r_s}$.



$$\Rightarrow i_{test}\left[1+\left(g_m+g_s+\frac{1}{r_o}\right)r_s\right] = \frac{v_{out}}{r_o}$$

$$\Rightarrow \frac{v_{out}}{i_{test}} = \boxed{r_o + r_s + [(g_m+g_s)r_o]\,r_s} = \boxed{177\,k\Omega}.$$