$$\tau_{R(110)-[1\bar{1}1]} = (4.0\ \text{MPa})\left[\cos(45°)\cos(54.7°)\right] = (4.0\ \text{MPa})(0.707)(0.578) = 1.63\ \text{MPa}$$

Now, we must determine the value of ϕ for the (011)–$[1\bar{1}1]$ slip system—that is, the angle between the direction of the applied stress, [100], and the normal to the (011) plane—i.e., the [011] direction. Again using Equation 7.6

$$\lambda_{[100]-[011]} = \cos^{-1}\left[\frac{(1)(0) + (0)(1) + (0)(1)}{\sqrt{\left[(1)^2 + (0)^2 + (0)^2\right]\left[(0)^2 + (1)^2 + (1)^2\right]}}\right]$$

$$= \cos^{-1}(0) = 90°$$

Thus, the resolved shear stress for this (011)–$[1\bar{1}1]$ slip system is

$$\tau_{R(011)-[1\bar{1}1]} = = (4.0\ \text{MPa})\left[\cos(90°)\cos(54.7°)\right] = (4.0\ \text{MPa})(0)(0.578) = 0\ \text{MPa}$$

And, finally, it is necessary to determine the value of ϕ for the $(10\bar{1})-[1\bar{1}1]$ slip system —that is, the angle between the direction of the applied stress, [100], and the normal to the $(10\bar{1})$ plane—i.e., the $[10\bar{1}]$ direction. Again using Equation 7.6

$$\lambda_{[100]-[10\bar{1}]} = \cos^{-1}\left[\frac{(1)(1) + (0)(0) + (0)(-1)}{\sqrt{\left[(1)^2 + (0)^2 + (0)^2\right]\left[(1)^2 + (0)^2 + (-1)^2\right]}}\right]$$

$$= \cos^{-1}\left(\frac{1}{\sqrt{2}}\right) = 45°$$

Here, as with the (110)–$[1\bar{1}1]$ slip system above, the value of ϕ is 45°, which again leads to

$$\tau_{R(10\bar{1})-[1\bar{1}1]} = (4.0\ \text{MPa})\left[\cos(45°)\cos(54.7°)\right] = (4.0\ \text{MPa})(0.707)(0.578) = 1.63\ \text{MPa}$$

(b) The most favored slip system(s) is (are) the one(s) that has (have) the largest τ_R value. Both (110)–$[1\bar{1}1]$ and $(10\bar{1})-[1\bar{1}1]$ slip systems are most favored since they have the same τ_R (1.63 MPa), which is greater than the τ_R value for $(011)-[1\bar{1}1]$ (viz., 0 MPa).