24. It should be noted that when the problem statement says the "masses of the proton and the deuteron are ..." they are actually referring to the corresponding atomic masses (given to very high precision). That is, the given masses include the "orbital" electrons. As in many computations in this chapter, this circumstance (of implicitly including electron masses in what should be a purely nuclear calculation) does not cause extra difficulty in the calculation (see remarks in Sample Problems 43-4, 43-6, and 43-7). Setting the gamma ray energy equal to $\Delta E_{\rm be}$, we solve for the neutron mass (with each term understood to be in u units):

$$\begin{aligned} m_{\rm n} &= M_{\rm d} - m_{\rm H} + \frac{E_\gamma}{c^2} \\ &= 2.0141019 - 1.007825035 + \frac{2.2233}{931.502} \\ &= 1.0062769 + 0.0023868 \end{aligned}$$

which yields $m_{\rm n} = 1.0086637\,\text{u}$, where the last digit (7) is uncertain to within roughly ± 2 (but this depends on what precisely the uncertainties are in the given data).