Question #2
Answer: E

$$
\begin{aligned}
1000\bar{A}_x &= 1000\left[\bar{A}^1_{x:\overline{10}|} + {}_{10|}\bar{A}_x\right] \\
&= 1000\left[\int_0^{10} e^{-0.04t}e^{-0.06t}(0.06)dt + e^{-0.4}e^{-0.6}\int_0^{\infty} e^{-0.05t}e^{-0.07t}(0.07)dt\right] \\
&= 1000\left[0.06\int_0^{10} e^{-0.1t}dt + e^{-1}(0.07)\int_0^{\infty} e^{-0.12t}dt\right] \\
&= 1000\left[0.06\left[\tfrac{-e^{-0.10t}}{0.10}\right]_0^{10} + e^{-1}(0.07)\left[\tfrac{-e^{-0.12t}}{0.12}\right]_0^{\infty}\right] \\
&= 1000\left[\tfrac{0.06}{0.10}\left[1-e^{-1}\right] + \tfrac{0.07}{0.12}e^{-1}\left[1-e^{-1.2}\right]\right] \\
&= 1000\left(0.37927 + 0.21460\right) = 593.87
\end{aligned}
$$

Because this is a timed exam, many candidates will know common results for constant force and constant interest without integration.

For example $\bar{A}^1_{x:\overline{10}|} = \dfrac{\mu}{\mu+\delta}\left(1 - {}_{10}E_x\right)$

$${}_{10}E_x = e^{-10(\mu+\delta)}$$

$$\bar{A}_x = \frac{\mu}{\mu+\delta}$$

With those relationships, the solution becomes

$$
\begin{aligned}
1000\bar{A}_x &= 1000\left[\bar{A}^1_{x:\overline{10}|} + {}_{10}E_x\ A_{x+10}\right] \\
&= 1000\left[\left(\frac{0.06}{0.06+0.04}\right)\left(1-e^{-(0.06+0.04)10}\right) + e^{-(0.06+0.04)10}\left(\frac{0.07}{0.07+0.05}\right)\right] \\
&= 1000\left[\left(0.60\right)\left(1-e^{-1}\right) + 0.5833e^{-1}\right] \\
&= 593.86
\end{aligned}
$$