Question #194
Answer: B

Although simultaneous death is impossible, the times of death are dependent as the force of mortality increases after the first death. There are two ways for the benefit to be paid. The first is to have (x) die prior to (y). That is, the transitions are State 0 to State 2 to State 3. The EPV can be written with a double integral

$$\int_0^\infty e^{-0.04t}\,{}_t p_{xy}^{00}\,\mu_{x+t:y+t}^{02}\int_0^\infty e^{-0.04r}\,{}_r p_{x+t:y+t}^{22}\,\mu_{x+t+r:y+t+r}^{23}\,dr dt$$

$$= \int_0^\infty e^{-0.04t}e^{-0.12t}\,0.06\int_0^\infty e^{-0.04r}e^{-0.10r}\,0.10\,dr dt = \frac{0.06}{0.16}\frac{0.10}{0.14} = 0.26786$$

By symmetry, the second case (State 0 to State 1 to State 3) has the same EPV. Thus the total EPV is 10,000(0.26786+0.26786) = 5,357.