Question #85
Answer: E

At issue, expected present value (EPV) of benefits

$$= \int_0^\infty b_t v^t \, {}_t p_{65} \, \mu_{65+t} \, dt$$

$$= \int_0^\infty 1000\left(e^{0.04t}\right)\left(e^{-0.04t}\right) {}_t p_{65} \, \mu_{65}(t) \, dt$$

$$= 1000\int_0^\infty {}_t p_{65} \, \mu_{65}(t) \, dt = 1000 \, {}_\infty q_{65} = 1000$$

EPV of premiums $= \pi \bar{a}_{65} = \pi\left(\frac{1}{0.04 + 0.02}\right) = 16.667\pi$

Benefit premium $\pi = 1000 / 16.667 = 60$

$${}_2\overline{V} = \int_0^\infty b_{2+u} \, v^u \, {}_u p_{67} \, \mu_{65}(2+u) du - \pi \bar{a}_{67}$$

$$= \int_0^\infty 1000 \, e^{0.04(2+u)} e^{-0.04u} \, {}_u p_{67} \, \mu_{65}(2+u) du - (60)(16.667)$$

$$= 1000 e^{0.08} \int_0^\infty {}_u p_{67} \mu_{65}(2+u) \, du - 1000$$

$$= 1083.29 \, {}_\infty q_{67} - 1000 = 1083.29 - 1000 = 83.29$$