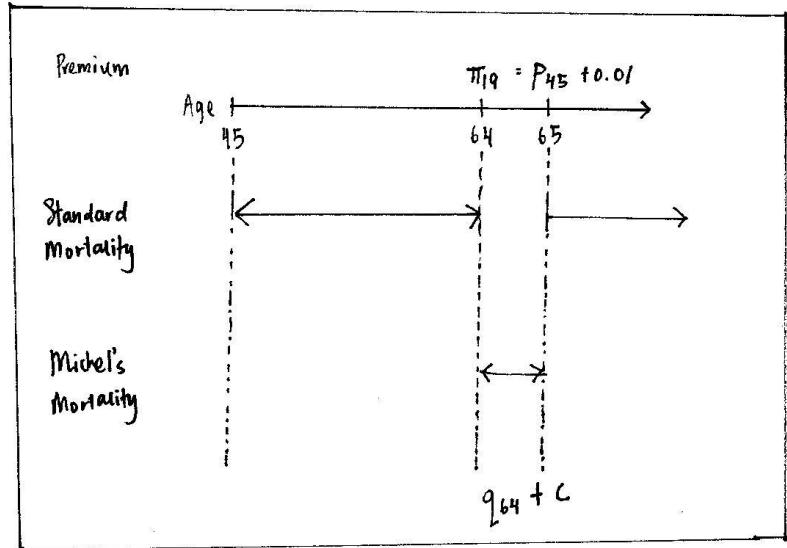


MLC Question 23.

FD WL of 1



Recursive Reserves:

$$(1+i)({}_hV + \pi_h) = b_{h+1}q_{x+h} + {}_{h+1}Vp_{x+h}$$

Standard mortality:

$$\begin{aligned} (1.03)({}_{19}V_{45} + P_{45}) &= 1 \cdot q_{64} + P_{64} {}_{20}V_{45} \\ &= q_{64}(1 - {}_{20}V_{45}) + {}_{20}V_{45} \end{aligned}$$

$${}_{20}V_{45} = 1.03({}_{19}V_{45} + P_{45}) - q_{64}(1 - {}_{20}V_{45}) \quad (1)$$

$${}_{20}V_{45} = 1.03({}_{19}V_{45} + P_{45} + 0.01) - (q_{64} + c)(1 - {}_{20}V_{45}) \quad (2)$$

$$(1) - (2): \quad 0 = -1.03(0.01) + c(1 - {}_{20}V_{45})$$

$$c = 0.018$$

(D)