

TOPIC

Economics – Section VI – Question 8

QUESTION

Constructing a roadway costs \$700,000 per lane mile. The estimated life is 15 years. If additional money were spent on extra annual maintenance, the life of the roadway could be extended to 25 years. At a 10% interest rate, an appropriate annual amount that should be spent on annual maintenance to extend the life of the roadway most nearly is

- (A) \$7,910
- (B) \$14,910
- (C) \$21,910
- (D) \$28,910

HINT

The appropriate annual amount to be spent on maintenance is that where the equivalent uniform annual cost (EUAC) for the roadway with its life extended to 25 years equals the equivalent uniform annual cost (EUAC) for the roadway with a 15-year life.

SOLUTION

The appropriate annual amount to be spent on maintenance is that where the equivalent uniform annual cost (EUAC) for the roadway with its life extended to 25 years equals the equivalent uniform annual cost (EUAC) for the roadway with a 15-year life.

EUAC for 25 year life = EUAC for 15 year life

$700000 (A/P, 10\%, 25) + \text{Extra annual maintenance} = 700000 (A/P, 10\%, 15)$

$700000 \left[\frac{0.1(1+0.1)^{25}}{(1+0.1)^{25}-1} \right] + \text{Extra annual maintenance} = 700000 \left[\frac{0.1(1+0.1)^{15}}{(1+0.1)^{15}-1} \right]$

$700000 (0.1102) + \text{Extra annual maintenance} = 700000 (0.1315)$

$77140 + \text{Extra annual maintenance} = 92050$

Extra annual maintenance = \$14,910

ANSWER

(B)

CONTRIBUTOR

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