TOPIC
Economics – Section VI – Question 6

QUESTION
A highway engineer is considering two possible alternatives for repairing a damaged pavement. The analysis period is 20 years. The first alternative, A, involves a simple periodic resurfacing every five years. This alternative has an initial cost of $15,000, an annual maintenance of $700 per year, and no salvage value at the end of its five-year useful life. The second alternative, B, involves replacing the damaged pavement and costs $30,000. There is no maintenance cost in the first year, there is a maintenance cost of $200 in the second year, and the maintenance cost increases $200 per year in all subsequent years. There is an anticipated $5,000 salvage value at the end of the 20-year analysis period. If the interest rate is 6%, the alternative the engineer should select is

(A) Alternative A
(B) Alternative B
(C) Neither A or B are good alternatives
(D) Both A and B are equally good alternatives

HINT
Find the present worth of each alternative.

SOLUTION
Present worth of cost of 20 years of alternative A

= 15000 + 15000 (P/F, 6%, 5) + 15000 (P/F, 6%, 10) + 15000 (P/F, 6%, 15)
+ 700 (P/A, 6%, 20)
= 15000 + 15000 (0.7473) + 15000 (0.5584) + 15000 (0.4173) + 700 (11.47)
= 15000 + 11209.50 + 8376 + 6259.50 + 8029
= $48,874

Present worth of cost of 20 years of alternative B

= 30000 + 200 (P/G, 6%, 20) – 5000 (P/F, 6%, 20)
= 30000 + 200 (87.23) – 5000 (0.3118)
= 30000 + 17446 – 1559
= $45,887

ANSWER
(B)

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