Solution

CADET _____ SECTION _____ TIME OF DEPARTURE _____

DEPARTMENT OF CHEMISTRY & LIFE SCIENCE

QUIZ 4 – CH402 2023-2024
10 Minutes, 24 Points
1 March 2024

TEXT: McCabe, Smith, and West
SCOPE: Chapter 7

References Permitted: FE Reference Handbook

INSTRUCTIONS

1. Do not mark this quiz until "begin work" is given. You will have 10 minutes.
2. Solve the problems in the space provided. Show all work to receive credit.
3. There are 6 problems on 3 pages in this quiz, not including the cover page.
4. Write your name on the top of each sheet.
5. Show work to receive partial credit.

(TOTAL WEIGHT: 24 POINTS)

DO NOT WRITE IN THIS SPACE

PROBLEM	VALUE	CUT
1	6	b
2	6	a
3	6	b
4	6	c
CUT		
BONUS 1	3	c
BONUS 2	3	d
GRADE	24	

Solution

1. Determine the capitalized cost for the following equipment, assuming a useful life of 10 years and a discount rate of 10%. Ignore taxes and inflation.

Purchased Cost:	$16,360
Salvage value:	$2,500

(A) $15,244
(B) $25,050
(C) $40,244
(D) $41,938

$$\$16,300 + \frac{\overbrace{(A/F, 10\%, 10)}^{.0627} \cdot (\$16,300 - \$2,500)}{.10} = \underline{\$25,050}\ \text{ANS}$$

2. A company is considering two different systems to manufacture a product. The first system will cost $2,500 and the manufacturing cost per unit will be $1.25. The second system is more highly automated but will cost $7,000 with manufacturing cost per unit of $0.50. With an anticipated annual volume of 1,500 units and neglecting interest, the breakeven point (in years) is most nearly:

A) 4.0
B) 3.5
C) 2.8
D) 2.0

$$\$2500 + \frac{\$1.25}{\text{unit}} \cdot \frac{1500\ \text{units}}{\text{yr}} \cdot n\ \text{yrs} = \$7,000 + \frac{\$.50}{\text{unit}} \cdot \frac{1500\ \text{units}}{\text{yr}} \cdot n\ \text{yrs}$$

$$\underline{n = 4}\ \text{ANS}$$

Solution

3. A company is planning to upgrade a distillation unit 6 years from now. At that time, the cost is estimated to be $75,200. If an account earns 8% per year compounded annually, what amount that must be placed into the account now in order to accumulate the necessary purchase price?

(A) $51,225
(B) $47,390
(C) $41,250
(D) $35,750

$\$75{,}200 \cdot (P/F, 8\%, 6) = \$47{,}391$ (.6302) — ANS

4. A company purchases a new plant for $28.5 million. Based on the MACRS method with a recovery period of 10 years and no salvage value, the fifth-year depreciation is most nearly:

(A) $3.28 million
(B) $2.85 million
(C) $2.63 million
(D) $4.10 million

$\$28.5 \text{ million} \cdot .0922 = \$2.63 \text{ million}$ — ANS

Solution

Bonus 1 – 6 points

The annual net profits from a chemical facility are $500,000 in the first year and increase by $50,000 each year (assumed at the end of each year). Assuming a facility life of 12 years and an interest rate of 8%, what is the present worth of the profits?

A) $1,732,000
B) $3,768,000
C) $5,500,000
D) $9,300,000

$\$500{,}000 \cdot \underbrace{(P/A, 8\%, 12)}_{7.3561} + \$50{,}000 \cdot \underbrace{(P/G, 8\%, 12)}_{34.6339} = \$5{,}500{,}000$ ANS

Bonus 2 – 6 points

2. Determine the capitalized cost for the following equipment, assuming a useful life of 8 years and a discount rate of 10%. Ignore taxes and inflation.

Purchased Cost:	$16,300
Annual maintenance cost:	$1,000
Salvage value:	$2,500

FE manual page 231

(A) $25,650
(B) $28,360
(C) $33,980
(D) $38,360

Cap Cost $P = \frac{A}{i}$ Cap Cost $= C_v + P$

$$\$16{,}300 + \frac{(\$16{,}300 - \$2{,}500)\underbrace{(A/F, 10\%, 8)}_{.0874} + \$1000}{.10} = \$38{,}361$$ ANS