Answer Key

Engineering Economy

1 to 3

$D = F - P$

$= ₱25000 - ₱17000$

$D = ₱8000$

$d = \frac{D}{F} = \frac{₱8000}{₱25000}$

$d = 32\%$ per period

$i = \frac{d}{1-d} = \frac{0.32}{1-0.32}$

$i = 47.06\%$

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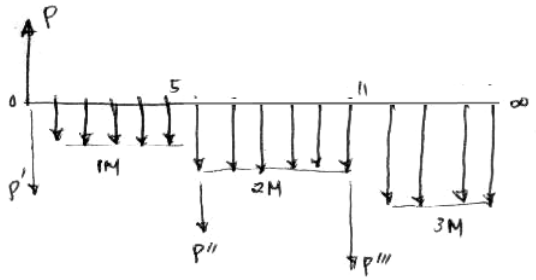
$$CC = C_o + P + \frac{S}{(1+i)^L - 1}$$

$$C_o = 100M + 0.1(100M) = 110M$$



$$P = P' + P''(1+i)^{-5} + P'''(1+i)^{-11}$$

$$= \frac{1M}{0.14}\left(1 - 1.14^{-5}\right) + \frac{2M}{0.14}\left(1 - 1.14^{-6}\right)\left(1.14^{-5}\right) + \frac{3M}{0.14}(1.14)^{-11}$$

$$P = 12.54275M$$

Hence;

$$CC = ₱110M + ₱12.54275M + \frac{₱200M}{(1.14)^{40} - 1}$$

$$CC = ₱123.6072M$$

COST - BENEFIT RATIO

$$\frac{C}{B} = \frac{₱1900000 - ₱288000}{₱1300000}$$

$$\frac{C}{B} = 1.24$$

PRESENT WORTH OF THE DEPRECIATION TAX

$$d = \frac{C_o - C_L}{n} = \frac{₱\,190\,000 - 0}{20} = ₱\,9500$$

AVERAGE TAX RATE

$$d_T = ₱\,9500(0.28) = ₱\,2660$$

$$P = \frac{d_T}{i}\left[1 - (1+i)^{-N}\right] = \frac{₱2660}{0.097}\left[1 - (1.097)^{-20}\right]$$

$$\boxed{P = ₱\,23117.6388}$$

$$CC = C_0 + P + \frac{S}{(1+i)^L - 1}$$

$$= \$65000 + \frac{\$7520}{0.11} + \frac{(\$65000 - \$3800)}{(1+0.11)^8 - 1}$$

$$CC = \$180276.8047$$

$$CC = P$$

$$= \frac{\$22000}{0.07}$$

$$CC = \$314285.7143$$

BOND VALUE

$$P = \frac{Fr}{i}\left[1-(1+i)^{-N}\right] - C(1+i)^{-N}$$

$$₱5950 = \frac{₱355}{i}\left[1-(1+i)^{-10}\right] + ₱7900(1+i)^{-10}$$

$$i = 8.20\%$$

$$P = \frac{Fr}{i}\left[1-(1+i)^{-N}\right] + C(1+i)^{-N}$$

$$= \frac{₱43000\,(0.125)}{0.10}\left[1-(1.10)^{-15}\right] + ₱52000\,(1.10)^{-15}$$

$$P = ₱53331.0639$$

CAPITAL RECOVERY

$$CR = \frac{Si}{(1+i)^t - 1} + FC(i)$$

$$= \frac{(₱29000 - ₱11000)(0.0945)}{(1+0.0945)^5 - 1} + (₱29000)(0.0945)$$

$$CR = ₱5721.3225$$

DECLINING BALANCE METHOD

$$C_6 = C_0(1-k)^n$$

$$k = 1 - \left(\frac{C_L}{C_0}\right)^{1/L} = 1 - \left(\frac{₱6130}{₱58250}\right)^{1/10}$$

$$k = 0.2016$$

$$C_6 = ₱58250(1-0.2016)^6$$

$$C_6 = ₱15086.7139$$

$$CC = FC + P$$

$$= ₱130000 + \frac{₱12000}{0.10}$$

$$CC = ₱250000$$

$$C_1 = C_0 - D_n$$

$$\text{sum} = \frac{n}{2}(a_1 + a_n) = \frac{10}{2}(10 + 1)$$

$$\text{sum} = 55$$

$$C_1 = ₱10300 - \frac{₱9200}{55}(10)$$

$$C_1 = ₱8627.2727$$

$$d_3 = \frac{\text{Reversed digit}}{\text{Sum of digits}} (C_6 - C_L)$$

$$\text{Sum} = \frac{n}{2}(a_1 + a_n) = \frac{15}{2}(15+1)$$

$$\text{Sum} = 120$$

$$d_3 = \frac{13}{120}(₱21300 - 0)$$

$$\boxed{d_3 = ₱2307.5}$$