Answer Key

Engineering Economy

$P = ₱26\,000$

$n = 4.5$ years

$i = 13\%$ simple interest

$$F = P(1 + in) = ₱26000\,[1 + (0.13)(4.5)]$$

$$\boxed{F = ₱41210}$$

$P = ₱2200$

$i = 18\%$ simple interest

$n = (8 \text{ months})\left(\frac{1 \text{ yr}}{12 \text{ months}}\right) = 0.6667$

$F = P(1 + in)$

$= ₱2200\left[1 + (0.18)(0.6667)\right]$

$F = ₱2464$

$e = 70\%$

Fixed costs = ₱78000

Variable costs = ₱135 per unit

Selling price = ₱380 per unit

Capacity = 4500 units

$$\text{Income} = \left(₱380/\text{unit}\right)\left(4500 \text{ units}\right)\left(0.70\right)$$

$$= ₱1197000$$

$$\text{Expenses} = \left(₱135/\text{unit}\right)\left(4500 \text{ unit}\right)\left(0.70\right) + ₱78000$$

$$= ₱503250$$

Hence;

Profit = ₱1197000 − ₱503250

Profit = ₱693750

Capacity = 260 $\frac{\text{motors}}{\text{month}}$

Variable costs = ₱160 per motor

Selling price = ₱330 per motor

Fixed costs = ₱18000 per month

Income = Expenses

$(₱330/\text{motor})x = (₱160/\text{motor})x + ₱18000/\text{month}$

$x = 105.8824$ generators

$x = 106$ generators

$P = ₱1600$

decline rate = 13%

$n = 7$ years

$$F = P(1-i)^n$$

$$= ₱1600\,(1-0.13)^7$$

$$F = ₱603.6077$$

Investment = ₱22000

$i = 5\%$ per month

$$F = P(1+i)^n$$

$$2(₱22000) = ₱22000(1+0.05)^{12n}$$

$$n = 1.1839$$

$F = 4P$

$i = \frac{0.15}{4} = 0.0375$ compounded quarterly

$n = 4n$

$F = P(1+i)^n$

$4P = P(1+0.0375)^{4n}$

$n = 9.4142$ years

$F = 3P$

$i = 12\%$ compounded annually

$$F = P(1+i)^n$$

$$3P = P(1+0.12)^n$$

$$n = 9.6940$$

$i = 8\%$ compounded monthly

$F = ₱8200$

$F = P(1+i)^n$

$₱8200 = P\left(1 + \frac{0.08}{12}\right)^{(10)(12)}$

$P = ₱3694.2924$

Compound Interest = ₱2950

i = 12% compounded bi-monthly

$n = 12$

Compound interest = $F - P$

$₱2950 + P = F$

and; $F = P(1+i)^n$

$$₱2950 + P = P\left(1 + \frac{0.12}{6}\right)^{6(12)}$$

$$P = ₱933.2075$$

$P = ₱1200$

$n = 3$ years

$F = ₱2820$ compounded bi-monthly

$$F = P(1+i)^n$$

$$₱2820 = ₱1200(1+i)^{3(6)}$$

$$i = (0.0486)(6)$$

$$\boxed{i = 29.16\%}$$ compounded bi-monthly

$P = ₱3800$

$i = 13\%$ compounded quarterly

$n = 6$ years and 8 months

$$n = (80 \text{ months})\left(\frac{1 \text{ yr}}{12 \text{ months}}\right) = 6.6667$$

$$F = P(1+i)^n$$

$$= ₱3800\left(1 + \frac{0.13}{4}\right)^{(6.6667)(4)}$$

$$F = ₱8916.3489$$

$i = 4.8\%$ compounded continuously

$P = ₱8000$

$n = 15$ years

$$F = Pe^{in}$$

$$= ₱8000\, e^{(0.048)(15)}$$

$$F = ₱16435.4657$$

$P = ₱3623$

$n = 13$ years

$F = ₱35431$

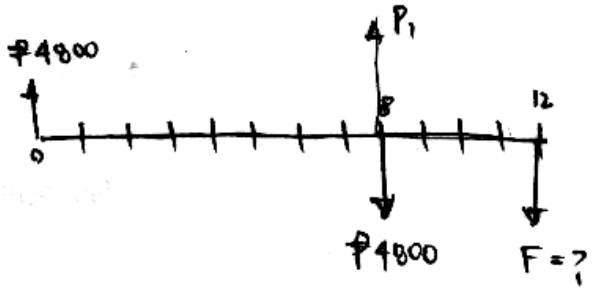
$i = ?$ semi-annually

$$F = P(1+i)^n$$

$$₱35431 = ₱3623\,(1+i)^{(13)(2)}$$

$$i = (0.09167)(2)$$

$$i = 18.33\%$$



$F_1 = P(1+i)^n$

$= ₱4800(1+0.09)^8$

$F_1 = ₱9564.3007$

$P_1 = ₱9564.3007 - ₱4800$

$P_1 = ₱4764.3007$

Hence;

$F = P_1(1+i)^n$

$= ₱4764.3007(1+0.09)^4$

$F = ₱6725.1992$

$P = ₱220\,500$

$n = 8$ years

$F = ₱1\,000\,000$

$i = ?$

$$F = P(1+i)^n$$

$$₱1\,000\,000 = ₱220\,500(1+i)^8$$

$$\boxed{i = 20.80\%}$$

$P = ₱63000$

$i = 6.5\%$ compounded monthly

$n = 8$ years

$$F = P(1+i)^n$$

$$= ₱63000\left(1+\frac{0.065}{12}\right)^{8(12)}$$

$$F = ₱105819.145$$

$$\text{Profit} = ₱105819.145 - ₱63000$$

$$\boxed{\text{Profit} = ₱42819.145}$$

$F = ₱550000$

$n = 7 \text{ years}$

$i = 13.6\%$ compounded semi-annually

$$F = P(1+i)^n$$

$$₱550000 = P\left(1 + \frac{0.136}{2}\right)^{2(7)}$$

$$P = ₱218960.1852$$

$P = ₱18\,000$

$i = 10\%$ compounded quarterly

$n = 10$ years

$$F = P(1+i)^n$$

$$= ₱18000\left(1 + \frac{0.10}{4}\right)^{10(4)}$$

$$F = ₱48331.1491$$

Selling price : P = ₱480000

Discount rate D_R = 16%

$$D_R = \frac{F - P}{F}$$

$$0.16 = \frac{F - ₱480000}{F}$$

$$F = ₱571420.5714$$

$F = ₱380\,000$

$P = ₱280\,000$

$$D_R = \frac{F - P}{F} = \frac{₱380\,000 - ₱280\,000}{₱380\,000}$$

$D_R = 26.32\,\%$