



**Saint Louis College
City of San Fernando, La Union
Department of Civil Engineering**



**ENGINEERING ECONOMICS
FINAL REQUIREMENT**

2.) The engineer of a medium scale industry was instructed to prepare at least two plans which is to be considered by management for the improvement of their operations. Plan A calls for an initial investment of P200,000 now with a prospective salvage value of 20% of the first cost 20 years hence. The operation and maintenance disbursements are estimated to be P15,000 a year and taxes will be 2% of first cost. Plan B calls for an immediate investment of P140,000 and a second investment of P160,000 eight years later. The operation and maintenance disbursements will be P9,000 a year for the initial installation and P8,000 a year for the second installation. At the end of 20 years, the salvage value shall be 20% of the investments. Taxes will be 2% of the first cost. If money is worth 12%, which plan would you recommend using the present worth cost method?

A. Plan A is more economical, P314,564

B. Plan B is more economical, P314,564

C. Plan A is more economical, P337,771

D. Plan B is more economical, P337,771

Solution:

Plan A

Initial Investment= P200000

Salvage value= 20% of first cost for 20 years

Maintenance cost= 15000 for a year

Taxes= 2% of first cost

Plan B

Initial Investment= P140000

Second Investment after 8 years= 160000

Salvage value= 20% first cost for 20 years

Maintenance cost= 9000 for a year for first and 8000 for a year for second installation

Taxes= 2% of first cost

Money is worth 12%

Plan A

$$\begin{aligned}
 PW \text{ of plan A cost} &= 200000 + \left[15000 + \left(200000 \times \frac{2}{100} \right) \right] \times \left(\frac{P}{A}, 12\%, 20 \right) - \left(200000 \times \frac{20}{100} \right) \times \left(\frac{P}{F}, 12\%, 20 \right) \\
 &= 200000 + [15000 + 4000] \times 7.4694 - (400000 \times 0.1037) \\
 &= 200000 + (19000 \times 7.4694) - 4148 \\
 &= P337770.6
 \end{aligned}$$

Plan B

$$\begin{aligned}
 &[140000 + 1600000 \times \left(\frac{P}{F}, 12\%, 8 \right) + 9000 \times \left(\frac{P}{A}, 12\%, 20 \right) + 8000 \times \left(\frac{P}{A}, 12\%, 12 \right) + \left(140000 \times \frac{2}{100} \right) \times \left(\frac{P}{A}, 12\%, 20 \right) \\
 &- \left(140000 \times \frac{20}{100} \right) \times \left(\frac{P}{F}, 12\%, 20 \right)] \\
 &= 140000 + (160000 \times 0.4039) + (9000 \times 7.4694) + (8000 \times 6.1944) + (280000 \times 7.4694) - (28000 \times 0.1037) \\
 &= 140000 + 64624 + 67224.6 + 49552.2 + 20914.32 + 2903.6 \\
 &= 339414.52
 \end{aligned}$$

PLAN A Cost < PLAN B Cost

Answer: **Thus, plan a is more economical, p337770.6**

4.) Determine the B/C ratio for the following project.

First cost = P100,000

Project life = 5 years

Salvage value = P10,000

Annual benefits = P60,000

Annual operation and maintenance = P22,000

Interest rate = 15%

A. 1.19

B. 1.29

C. 1.39

D. 1.49

Solution:

B/C RATIO = Present value of benefits / present value of costs.

Present value of benefits = Annual benefits x PVIAF (15%, 5 years) + Salvage value x PVIF (15%, 5 years)

$$P 60000 \times 3.35216 + P 10000 \times 0.49718$$

$$= P 206101.40$$

Present value of costs = First cost + Annual value O and M $\times$ PVIAF (15%, 5 years)

$$= P 100000 + 20000 \times 3.35216$$

$$= P 173747.52$$

$$B/C \text{ ratio} = P 206101.40 / P 173747.52 = 1.19$$

A. 1.19

- 6.) First Benchmark Publishing's gross margin is 50% of sales. The operating costs of the publishing are estimated at 12% of sales. If the company is within the 40% tax bracket, determine the percent of sales is their profit after taxes?

A. 21 %

B. 20 %

C. 19 %

D. 18 %

Solution:

Gross margin = 50% of sales

Operating cost = 12% of sales

Net margin = Gross margin - operating cost

$$= 50\% - 12\% = 38\% \text{ of sales}$$

Tax rate = 40%

Tax = Net margin $\times$ Tax rate = $38\% \times 40\% = 15\%$ of sales

Net margin after tax implies profit taxes.

Net margin after tax = Net Margin - Tax

$$= 38\% - 15\%$$

= 23% of sales – Not in the choices

- 8.) A feasibility study shows that a fixed capital investment of P10,000,000 is required for a proposed construction firm and an estimated working capital of P2,000,000. Annual depreciation is estimated to be 12% of the fixed capital investment. Determine the rate of return on the total investment if the annual profit is P3,500,000.

A. 28.33 %

B. 29.17 %

C. 30.12 %

D. 30.78 %

Solution:

$$APR = \frac{\text{Average accounting profit}}{\text{Average investment}}$$

$$APR = \frac{350000}{12000000}$$

$$APR = 0.2917 \times 100$$

$$APR = 29.17$$

10.) Engr. Trinidad loans from a loan firm an amount of P100,000 with a rate of simple interest of 18% but the interest was deducted from the loan at the time the money was borrowed. If at the end of one year, she has to pay the full amount of P100,000, what is the actual rate of interest?

A. 23.5 %

B. 24.7 %

C. 25.0 %

D. 25.8 %

Solution:

Gross Loan=P100000

Interest rate=18%

Period=1year

Interest amount deducted=Gross loan*Interest rate*Period

=100,000*0.18*1

=P18,000

Actual amount received= Gross loan- Interest amount deducted

=100,000-18,000

=82,000

$$\text{Actual interest rate} = \frac{(\text{Par value at year end} - \text{Actual amount received})}{\text{Actual amount received}}$$

$$= \frac{(100000 - 82000)}{82000}$$

$$= \frac{18000}{82000}$$

$$= 0.219 \vee 22 \%$$

Hence,

Actual Interest rate=**22%- Not in the choices**

12.) Mr. Bacani borrowed money from the bank. He received from the bank P1,842 and promised to repay P2,100 at the end of 10 months. Determine the rate of simple interest.

A. 12.19 %

B. 12.03 %

C. 11.54 %

D. 10.29 %

Solution:

$$\text{Simple interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

$$\text{Interest} = 2100 - 1842 = 258$$

$$258 = \frac{1842 \times \text{Rate} \times \frac{10}{12}}{100}$$

$$\text{Rate} = 16.808 \% \text{ - Not in the choices}$$

14.) A man invested P110,000 for 31 days. The net interest after deducting 18% withholding tax is P890.36. Find the rate of return annually.

A. 11.50 %

B. 11.75 %

C. 11.95 %

D. 12.32 %

Solution:

$$\text{Total interest} = \frac{890.36}{(1 - 0.18)} = 1085.80$$

$$@ 1 \text{ month} = \frac{1085.80}{110000} = 0.99 \%$$

$$\text{Total rate return} = \frac{0.99(360)}{31}$$

$$\approx 11.50 \%$$

16.) Mr. Jun Ramos was granted a loan of P20,000 by his employer Excel First Review and Training Center, Inc. with an interest of 7% for 180 days on the principal collected in advance. The corporation would accept a promissory note for P20,000 non-interest for 180 days. If discounted at once, find the proceeds of the note.

A. P18,000

B. P18,900

C. P19,000

D. P19,100

Solution:

$$P = 20,000 \quad n = 180$$

$$i = 7\%$$

$$\text{Interest} = 0.07(20,000) = 1,400$$

$$\text{Proceeds on the note} = 20,000 - 1,400 = \underline{18,600} - \text{Not in the choices}$$

18.) The exact simple interest of P5,000 invested from June 21, 1995 to December 25, 1995 is P100. What is the rate of interest?

A. 3.90 %

B. 3.92 %

C. 3.95 %

D. 3.98 %

Solution:

$$100 = 5,000 \times \frac{R}{365} \times 187 \times 100$$

$$R = \frac{365 \times 100}{5,000 \times 187} \times 100$$

$$R = 3.9037\%$$

$$R = 3.90\%$$

20.) A loan for P50,000 is to be paid in 3 years at the amount of P65,000. What is the effective rate of money?

A. 9.01 %

B. 9.14 %

C. 9.31 %

D. 9.41 %

Solution:

$$FV = 65,000 \quad n = 3$$

$$PV = 50,000$$

$$FV = PV(1+i)^n$$

$$65,000 = 50,000(1+i)^{\left(\frac{1}{3}\right)} - 1$$

$$i = \left(\frac{65,000}{50,000}\right)^{\left(\frac{1}{3}\right)} - 1$$

$$i = 0.09139288306$$

$$i = 9.14\%$$

22.) What rate of interest compounded annually is the same as the rate of interest of 7%? compounded quarterly?

A. 8.07 %

B. 8.12 %

C. 8.16 %

D. 8.24 %

Solution:

$$i = 7\% \text{ or } 0.07$$

$$n = 4$$

$$ER = \left(1 + \frac{i}{n}\right)^n - 1$$

$$ER = \left(1 + \frac{0.07}{4}\right)^4 - 1$$

$$ER = 0.07185903129$$

$$ER = 7.19\%$$

-Not in the choices

24.) An amount of P1,000 becomes P1,608.44 after 4 years compounded bimonthly. Find the nominal interest.

A. 11.89%

B. 12.00%

C. 12.08%

D. 12.32%

Solution:

$$PV = 1,000 \quad n = 4(4) = 16$$

$$FV = 1,608.44$$

$$FV = PV(1+i)^n$$

$$1,608.44 = 1,000(1+i)^{16}$$

$$i = \left(\frac{1,608.44}{1,000} \right)^{\left(\frac{1}{16} \right)} - 1$$

$$i = 0.03014961381$$

$$\hookrightarrow 4 \times 0.03014961381$$

$$\hookrightarrow 0.12059845534$$

$$\hookrightarrow 12.05\%$$

-Not in the choices

26.) By the condition of a will, the sum of P20,000 is left to a girl to be held in trust fund by her guardian until it amounts to P50,000. When will the girl receive the money if fund invested at 7% compounded quarterly?

A. 11.23 years

B. 11.46 years

C. 11.57 years

D. 11.87 years

Solution:

$$A = P50,000 \quad i = 7\% \text{ or } 0.07$$

$$P = P20,000 \quad n = 4$$

$$A = P \left(1 + \frac{i}{n} \right)^{nt}$$

$$50,000 = 20,000 \left(1 + \frac{0.07}{4} \right)^{4t}$$

$$2.5 = (1.0175)^{4t}$$

$$\log(2.5) = \log(1.0175)^{4t}$$

$$\log(2.5) = 4t \log(1.0175)$$

$$t = \frac{\log(2.5)}{4 \log(1.0175)}$$

$$t = 13.20 \text{ yrs}$$

- Not in the choices

28.) Mandarin Bank advertises 9.5% account that yields 9.84% annually. Find how often the interest is compounded.

A. Monthly

B. Bimonthly

C. Quarterly

D. Annually

Solution:

$$ER = \left(1 + \frac{i}{n}\right)^n - 1$$

$$ER = \left(1 + \frac{0.095}{4}\right)^4 - 1$$

$$ER = 0.0984382791$$

$$ER = 9.84\%$$

➤ By trial and error, **n = 4**
Thus, the mode of interest is **quarterly**.

30.) You borrow P3,500.00 for one year from a friend at an interest rate of 1.5% per month instead of taking a loan from a bank at a rate of 18% per year. How much lesser you will pay by borrowing the money from the bank?

A. P 62.44

B. P44.55

C. P54.66

D. P37.56

Solution:

a. Borrow money from a friend

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

$$F = 3500(1+0.015)^{12} = \text{Php. } 4,184.66$$

b. Borrow money from a bank

$$F = 3500(1+0.18) = \text{Php. } 4,130$$

$$\therefore 4,184.66 - 4,130$$

$$= \text{Php. } 54.66 \quad - \text{C}$$

32.) A firm borrows P2,000 for 6 years at 7%. At the end of 6 years, it renews the loan for the amount due plus P2,000 more for 2 years at 8%. What is the lump sum due?

A. P 3,260.34

B. P 3,280.34

C. P 3,270.34

D. P 3,250.34

Solution:

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

$$F = 2000(1+0.07)^6 = 3001.460704$$

$$\text{NEW CAPITAL AFTER 6 YEARS} = 3001.460704 + 2000 = 5001.460704$$

Lump sum due after 2 years at 8%

$$F = 5001.460704(1 + 0.08)^2$$

Php. 5,833.70 – *Not in the choices*

34.) The institute of Electronics and Communications Engineers of the Philippines (IECEP) is planning to put up its own building. Two proposals being considered are:

A. The construction of the building now to cost P 400,000

B. The construction of a smaller building now to cost P300,000 and at the end of 5 years, an extension to be added to cost P 200,000. By how much is proposal B more economical than proposal A if interest rate is 20% and depreciation to be neglected?

A. P 19,122.15

B. P 19,423.69

C. P 19,518.03

D. P 19,624.49

Solution:

$$A. F = \frac{\frac{400,000}{1 - (1 + 0.20)^{-5}}}{0.20} = \text{Php. } 133,751.88$$

$$F = 400,000 + 133,751.88 = 533,751.88$$

$$B. F = 500,000$$

$$\text{Economical at B} = 533,751.88 - 500,000$$

$$= \text{Php. } 33,751.88 - \text{Not in the choices}$$

36.) What annuity is required over 12 years to equate with a future amount of P 20,000? Assume $i = 7\%$ annually.

A. P 1,290.34

B. P 1,185.54

C. P 1,107.34

D. P 1,205.74

Solution:

$$F = A \frac{(1 + i)^n - 1}{i}$$

$$20,000 = A \frac{(1 + 0.07)^{12} - 1}{0.07}$$

$$A = \text{Php. } 1,118.04 - \text{Not in the choices}$$

38.) What is the present worth of a year annuity paying P 3,000.00 at the end of each year, with interest at 7% compounded annually?

A. P 7,654.04

B. P 7,731.29

C. P 7,420.89

D. P 7,590.12

Solution:

$$P = A (P/A, i\%, n)$$

$$P = 3,000 (P/A, 7\%, 1)$$

$$P = 3,000 \frac{(1+0.07)^1 - 1}{0.07}$$

P = Php. 2,803.74 - Not in the choices

40.) A person buys a piece of lot for P 100,000 down payment and 10 deferred semi-annual payments of P 8,000 each, starting three years from now. What is the present value of the investment if the rate of interest is 10% compounded semi-annually?

A. P 142,999.08

B. P 143,104.89

C. P 142,189.67

D. P 143,999.08

Solution:

$$P_1 = A \frac{(1+i)^n - 1}{(1+i)^n i}$$

$$i = \frac{10}{2} = 5\%$$

$$P_1 = 8,000 \frac{(1+0.05)^{10} - 1}{(1+0.05)^{10} (0.05)}$$

$$P_1 = 61,773.87943$$

$$P_1 = P_2 (1+i)^n$$

$$61,773.87943 = P_2 (1+0.05)^5$$

$$P_2 = 48,401.45094$$

$$\text{TOTAL AMOUNT} = 100,000 + P_2$$

$$= 100,000 + 48,401.45094$$

TOTAL AMOUNT = Php. 148,401.45 - Not in the choices

42.) Miss Calledo deposited P 1,000, P 1,500 and P 2,000 at the end of the 2nd year, 3rd year and 4th year, respectively in a savings account which earned 12% per annum. How much is in the account at the end of the 4th year?

A. P 4,880.00

B. P 4,820.00

C. P 4,860.00

D. P 4,840.00

Solution:

@ 2nd Year

$$F = P (1 + 1(O.12))$$
$$= 1,000(1 + 1(0.12))$$

$$F = 1,120$$

@ 3rd Year

$$F = 1,500 (1 + 1(0.12))$$

$$F = 1,680$$

@ 3TH Year

$$F = 2000 (1 + 1(0.12))$$

$$F = 2,240$$

$$\text{TOTAL F} = 1,120 + 1,680 + 2,240$$

$$= \text{Php.5,040} \quad - \text{Not in the choices}$$

44.) A P 1,000, 5% bond pays dividend semiannually and will be redeemed at 110% on June 21, 204. It is bought on June 21, 2001 to yield 4% interest. Find the price of the bond.

A. P 1,122.70

B. P 1,144.81

C. P 1,133.78

D. P 1,155.06

Given:

$$F = P 1000$$

$$C = 110\% (1000) = 1100$$

$$r = 5\% = \frac{5\%}{2} = 0.025$$

$$i = 4\% = \frac{4\%}{2} = 0.02$$

$$n = 3 = 3(2) = 6$$

Solution:

$$Fr = 1000 (0.025) = 25$$

$$P = Fr (P/A, i\%, n) + C (P/F, i\%, n)$$

$$= 25 (P/A, i\%, 6) + 1100 (P/F, i\%, 6)$$

$$\begin{aligned}
 & 1 + 0.02 \cdot i^6 - 1 \\
 & = 25 \left(\frac{1 + 0.02 \cdot i^6 (0.02)}{(i)} + 1100 (1 + 0.02)^{-6} \right)
 \end{aligned}$$

$$P = 1116.804293$$

PRICE OF THE BOND = P 1116.80-Not in the choices

46.) A machine costs of P 8,000 and an estimated life of 10 years with a salvage value of P 500. What is its book value after 8 years using straight line method?

A. P 2,000.00

B. P 2,100.00

C. P 2,200.00

D. P 2,300.00

Given:

$$C_0 = P 8,000$$

$$L = 10$$

$$C_L = P 500$$

$$n = 8$$

Solution:

$$d = \frac{C_0 - C_L}{L}$$

$$i \frac{8,000 - 500}{10}$$

$$d = 750$$

$$D_8 = nd$$

$$= 8 (750)$$

$$D_8 = 6,000$$

$$C_8 = C_0 - D_8$$

$$= 8,000 - 6,000$$

$$\mathbf{C_8 = P 2,000}$$

48.) An asset is purchased for P 9,000.00. Its estimated economic life is 10 years after which it will be sold for P 1,000.00. Find the depreciation in the first three years using sum-of-years digit method

A. P 3,279.27

B. P 3,927.27

C. P 3,729.27

D. P 3,792.72

Given:

$$C_0 = P\ 9,000.00$$

$$C_L = P\ 1,000.00$$

$$n = 10$$

Solution:

Year	Year in Reverse order
1	10
2	9
3	8
4	7
5	6
6	5
7	4
8	3
9	2
10	1

$$\sum \text{of digits} = \frac{n(n+1)}{2}$$

$$\therefore \frac{10(10+1)}{2}$$

$$\sum \text{of digits} = 55$$

$$d = \frac{\text{reverse digit}}{\sum \text{of digits}} (C_0 - C_L)$$

$$d_1 = \frac{10}{55} (9000.00 - 1000.00)$$

$$\therefore 1454.545455$$

$$d_2 = \frac{9}{55} (9000.00 - 1000.00)$$

$$\therefore 1309.090909$$

$$d_3 = \frac{8}{55} (9000.00 - 1000.00)$$

$$\therefore 1163.636364$$

$$d = d_1 + d_2 + d_3$$

$$\therefore 1454.545455 + 1309.090909 + 1163.636364$$

$$\therefore 3927.272728$$

$$d = P 3927.27$$

50.) The Saudi Arabian Oil Refinery developed an oil well which is estimated to contain 5,000,000 barrels of oil at an initial cost of \$ 50,000,000. What is the depletion charge during the year where it produces half million barrels of oil? Use Unit or Factor method in computing depletion.

- A. \$ 5,000,000.00 B. \$ 5,010,000.00 C. \$ 5,025,000.00 D. \$ 5,050,000.00

Given:

Estimated barrels of oil = 5,000,000

Initial cost = \$ 50,000,000

Produced barrels of oil during the year = Half million = 500,000

Solution:

$$\text{Unit Depletion Rate} = \frac{\text{Cost}}{\text{Estimated barrels of oil}}$$

$$= \frac{50,000,000}{5,000,000}$$

$$\text{Unit Depletion Rate} = \$10 \text{ per barrel}$$

$$\text{Depletion charge during the year} = \text{Unit depletion rate} \times \text{Produced barrels of oil}$$

$$= 10(500,000)$$

$$\text{Depletion charge during the year} = \$5,000,000.00$$

The depletion charge during the year where it produces half million barrels of oil is \$ 5,000,000.00

52.) A manufacturing firm maintains one product assembly line to produce signal generators. Weekly demand for the generators is 35 units. The line operates for 7 hours per day, 5 days per week. What is the maximum production time per unit in hours required of the line to meet the demand?

- A. 1.0 hour per unit B. 1.2 hours per unit C. 1.4 hours per unit D. 1.6 hours per unit

Given:

Weekly demand = 35 units

Lines operate = 7 hours per day and 5 days per week

Solution:

$$\text{Total operating time} = 7(5) = 35$$

$$\text{Maximum production time} = \frac{\text{Weekly demand}}{\text{Total operating time}}$$

$$i \frac{35}{35}$$

Maximum production time = 1 hour per unit

54.) A leading shoe manufacturer produces a pair of Lebron James signature shoes at a labor cost of P 900.00 a pair and a material cost of P 800.00 a pair. The fixed charges on the business are P 5,000,000 a month and the variable costs are P 410.00 a pair. Royalty to Lebron James is P 1,000 per pair of shoes sold. If the shoes sell at P 5,000 a pair, how many pairs must be produced each month for the manufacturer to break-even?

A. 2,590

B. 2,632

C. 2,712

D. 2,890

Given:

Labor cost = P 900.00 a pair

Material cost = P 800.00 a pair

Fixed cost = P 5,000,000 a month

Variable cost = P 410.00 a pair

Royalty = P 1,000 per pair

Selling price = P 5,000 a pair

Solution:

$$\text{Total Cost} = \text{Labor Cost} + \text{Material Cost} + \text{Variable cost} + \text{Royalty}$$

$$i \ 900.00 + 800.00 + 410.00 + 1,000$$

$$\text{Total Cost} = P 3,110$$

$$\text{Breakeven point} = \frac{i \ \text{cost}}{(\text{price} - \text{total cost})}$$

$$i \ \frac{5,000,000}{(5,000 - 3,110)}$$

$$i \ 2645.502646$$

Breakeven point = P 2,646 -Not in the choices

56.) How long (in years) will it take the money to quadruple if it earns 8% compounded semi-annually?

A. 26.30 years

B. 33.15 years

C. 40.30 years

D. 20.15 years

Solution:

$$(F/P, i\%, n)$$

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

$$1 + \frac{r}{m} i^{mn}$$

$$4P = P i$$

$$1 + \frac{0.08}{2} i^{2n}$$

$$4P = P i$$

$$1 + 0.04 i^{2n}$$

$$4 = i$$

$$n = 17.67298769$$

n = 17.67 years -Not in the choices

58.) If P500,000 is deposited at a rate of 11% compounded monthly, determine the compounded interest after 7 years and 9 months.

A.P690,849

B.P680,686

C.P670,258

D.P660,592

Solution:

$$n = 12(7) + 9 = 93$$

$$i = 0.11/12 = 11/1200$$

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

$$= 500,000(1+11/1200)^{93}$$

$$F = 1,168,206.005$$

$$\text{Interest} = F - P = 1,168,206.005 - 500,000 =$$

Interest= P668,206.0047 - Not in the choices

60.) A bank is advertising 9.5% accounts that yields 9.84% annually. How often is the interest compounded?

A. monthly

B. quarterly

C. bi-monthly

D. daily

Solution:

$$ER = (1+i/n)^n - 1$$

$$0.0984 = (1+i/n)^n - 1$$

$$n = 4$$

Thus, the mode of interest is done quarterly

62.) In year zero, you invest P10,000.00 in a 15% security for 5 years. During that time, the average annual inflation is 6%. How much, in terms of year zero will be in the account at maturity?

A. P15,386.00

B. P13,382.00

C. P15,030.00

D. P16,653.00

Solution:

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

$$= 10000(1+0.15)^5$$

$$F = 20,113.57$$

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

$$20,113.57 = P' (1+0.06)^5$$

$$\mathbf{P' = P15,030}$$

64.) If the inflation rate is 5%, cost of money is 10%, what interest rate will take care of inflation and the cost of money?

A. 16.6%

B. 17.7%

C. 15.5%

D. 14.4%

Solution:

$$(1+i) = (1+i') (1+f)$$

$$(1+i) = (1+.1) (1+.05)$$

$$\mathbf{i = 0.155 \text{ or } 15.5\%}$$

66.) The inflated present worth of P2000 in two years is equal to P1471.07. What is the rate of inflation if the interest rate is equal to 8%?

A. 6%

B. 7%

C. 5%

D. 4%

Solution:

$$F = PV(1+i/1+f)^n$$

$$2000 = 1471.07(1+.08/1+f)^2$$

$$\mathbf{f = -.07 \text{ or } 7\%}$$

68.) An engineer bought an equipment for P500,000. Other expenses including installations amounted to P30,000. At the end of its estimated useful life of 10 years, the salvage value will be 10% of the first cost. Using straight line method of depreciation, what is the book value after 5 years?

A. P291,500

B. P242,241

C. P282,242

D. P214,242

Solution:

$$C_0 = 500,000 + 30,000 = 530,000$$

$$CL = .10(530,000) = 53,000$$

$$C_5 = C_0 - C_0 \cdot CL/L$$

$$= 530,000 - (530,000 \cdot 53,000/530,000)/2$$

$$C_5 = \text{P291,500}$$

70.) A machine has a salvage value of P12,000 at the end of its useful life of 6 years. The book value at the end of 5 years is P30,833.33. Using a straight line method of depreciation, what is the first cost of the machine?

A. P125,500

B. P125,000

C. P135,500

D. P135,000

Solution:

$$d = C_0 - C_n/n$$

$$d = C_0 - 12,000/6$$

$$C_m = C_0 - d(m)$$

$$30,833.33 = C_0 - (C_0 - 12,000/6)(5)$$

$$C_0 = \text{P125,000}$$

72.) A printing equipment costs P73,500 has a life expectancy of 8 years and has a salvage value of P3,500 at the end of its life. The book value at the end of x years is equal to P38,500. Using straight line method of depreciation, solve for the value of x.

A. 5 years

B. 6 years

C. 4 years

D. 3 years

Solution:

$$C_0 = \text{P73,500}$$

$$CL = \text{P3,500}$$

$$L = 8 \text{ years}$$

$$DEPRECIATION = \frac{73,500 - 3,500}{8} = \text{P8,750}$$

$$38500 = 73500 - 8750 (x)$$

$$X = 4 \text{ years} - C$$

74.) An engineer bought an equipment for P500,000. He spent an additional amount of P30,000 for installation and other expenses. The salvage value is 12% of the first cost. If the book value at the end of 5 years will be P291,500 using straight line method of depreciation, compute the useful life of the equipment in years.

A. 10 years

B. 6 years

C. 8 years

D. 15 years

Solution:

$$Co = 500000 + 30000 = P530,000 \quad L = 10$$

$$\text{Annual Depreciation after 5 years} = \left(\frac{530000 - CL}{10} \right) 5 = 26,500$$

$$\text{Book value after 5 years} = 530000 - \left(\frac{53,000 - 26500}{2} \right) = 447,000$$

$$S = 53,000$$

$$x = \frac{530,000}{53,000} = 10 \text{ years} - A$$

76.) The first cost of a machine is P1,800,000 with a salvage value of P300,000 at the end of its life of 5 years. Determine the total depreciation after 3 years. Using straight line method.

A. P800,000

B. P900,000

C. P600,000

D. P700,000

Solution:

$$\text{Total depreciation} = 300,000 + 300,000 + 300,000$$

$$= P 900,000 - B$$

YEAR	BOOK VALUE	DEPRECIATION (%)	DEPRECIATION AMOUNT	ACCUMULATED DEPRECIATION
1	1,800,000	20	300,000	300,000
2	1,500,000	20	300,000	600,000
3	1,200,000	20	300,000	900,000
4	900,000	20	300,000	1,200,000
5	600,000	20	300,000	1,500,000

78.) The first cost of a machine is P1,800,000 with a salvage value of P300,000 at the end of its life of 5 years. Determine the total depreciation after 3 years. Using constant percentage method.

- A. P1,355,024.24 B. P1,246,422.53 C. P1,185,769.76 **D. P1,432,624.84**

Solution:

$$\text{Total depreciation} = 720,000 + 432,000 + 259,200 = P 1,432,624.84 - D$$

YEAR	BOOK VALUE	DEPRECIATIO N (%)	DEPRECIATIO N AMOUNT	ACCUMULATE D DEPRECIATIO N
1	1,800,000	40	720,000	720,000
2	1,080,000	40	432,000	1,152,000
3	648,000	40	259,200	1,411,200
4	388,800	22.84	88,800	1,500,000
5	300,000	0	0	1,500,000

80.) The purchase of a motor for P6000 and a generator for P4000 will allow the company to produce its own energy. The configuration can be assembled for P500. The service will operate for 1600 hours per year for 10 years. The maintenance cost is P300 per year, and cost to operate is P0.85 per hour for fuel and related cost. Using straight line depreciation, what is the annual cost for the operation? There is a P400 salvage value for the system at the end of 10 years.

- A. P2,710 B. P2,630 C. P2,480 **D. P2,670**

SOLUTION:

$$\text{Total Cost} = 6000 + 4000 + 500 = P10,500$$

$$\text{Expected life} = 10 \text{ years}$$

$$\text{Annual fuel cost} = 0.85 \times 1600 = P1,360$$

$$\text{Annual depreciation} = \frac{10500 - 400}{10} = P 1,010$$

$$\text{Annual cost for the operation} = 300 + 1360 + 1010 = P2,670 - D$$

82.) A machine has an initial cost of P50,000.00 and a salvage value of P10,000.00 after 10 years. What is the book value after 5 years using straight line method depreciation rate?

- A. P35,000 B. P15,500 C. P25,000 **D. P30,000**

Solution:

$$\text{Depreciation} = \frac{50000 - 10000}{10} = P\ 4000$$

$$\text{Book value} = 50000 - (4000 \times 5) = \text{P}30,000 - \text{D}$$

84.) An asset is purchased for P90,000.00. Its estimated life is 10 years after which it will be sold for P1,000.00. Find the book value during the first year if Sum of the Years Digits (SYD) depreciation is used.

A. P7,545.45

B. P5,245.92

C. P2,980.24

D. P6,259.98

Solution:

$$\Sigma \text{ years} = \frac{10(10+1)}{2} = 55$$

$$d_1 = (90000 - 1000) \frac{10}{55} = 1454.55$$

$$\text{Book value} = 90000 - 1454.55 = \text{P}7,545.45 - \text{A}$$

86.) A consortium of international communications companies contracted for the purchase and installation of a fiber optic cable linking two major Asian cities at a total cost of P960M. This amount includes freight and installation charges at 10% of the above total contract price. If the cable depreciated over a period of 15 years with zero salvage value, what is the depreciation charge during the 8th year using the sum of year digits method?

A. P64 M

B. P80 M

C. P23 M

D. P76 M

Given: $L = 15 \text{ years}$, $C_O = 960 \text{ M}$, $C_L = 0$

Solution:

$$\Sigma \text{ of digits} = \frac{L(L+1)}{2}$$

$$= \frac{15(15+1)}{2}$$

$$= 120$$

Reverse digit of 8th year is 8

$$d_n = \frac{\text{reverse digit}}{\Sigma \text{ of digits}} (C_O - C_L)$$

$$d_n = \frac{8}{120} (960,000,000 - 0)$$

1	15
2	14
3	13
4	12
5	11
6	10
7	9
8	8
9	7
10	6
11	5
12	4
13	3
14	2
15	1

$$d_n = P 64,000,000 \quad -A$$

88.) A certain equipment costs P7,000 has an economic life of n years and a salvage value P350 at the end of n years. If the book value at the end of 4 years is equal to P2197.22, compute for the economic life of the equipment using the sum of years' digit method.

A. 10 years

B. 8 years

C. 16 years

D. 11 years

Given: $C_0 = P 7,000$, $C_L = P 350$, $n = 4 \text{ years}$, $C_n = P 2,197.22$

Solution:

(Since the sum of reverse in prob. 90 is 26)

$$D_n = C_0 - C_n$$

$$D_4 = 7,000 - 2,197.22$$

$$D_4 = P 4,802.78$$

$$D_n = \frac{\sum \text{of reverse}}{\sum \text{of digits}} (C_0 - C_L)$$

$$P 4,802.78 = \frac{\sum \text{of reverse}}{x} (P 7,000 - P 350)$$

$$x = 36$$

$$\sum \text{of digits} = \frac{L(L+1)}{2}$$

$$36 = \frac{L(L+1)}{2}$$

$$L = 8 \text{ years} \quad -B$$

90.) An equipment costs P7000 and has a life of 8 years and salvage value of x after 8 years. If the book value of the equipment at the 4th year is equal to P2197.22, compute the salvage value x using the sum of years' digit method.

A. P594

B. P350

C. P430

D. P290

Given: $C_0 = P 7,000$, $L = 8 \text{ years}$, $n = 4 \text{ years}$, $C_n = P 2,197.22$

Solution:

1	8
2	7
3	6
4	<u>5</u>
5	26
6	
7	
8	

$$D_n = \frac{\sum \text{of reverse}}{\sum \text{of digits}} (C_o - C_L)$$

$$D_4 = \frac{26}{36} (7,000 - x) \text{ eq. 1}$$

$$C_n = C_o - D_n$$

$$2,197.22 = 7,000 - \frac{26}{36} (7,000 - x)$$

$$x = P 350 \quad \text{-B}$$

92.) A machine having a certain first cost has a life of 10 years and a salvage value of 6.633% of the first cost at the end of 10 years. If it has a book value of P58,914 at the end of the 6th year, how much is the first cost of the machine if the constant percentage of declining value is used in the computation for its depreciation. (Matheson's Method)

A. P600,000

B. P100,000

C. P300,000

D. P900,000

Given: $C_L = 6.633\% (C_o)$, $L = 10 \text{ years}$, $n = 6 \text{ years}$, $C_n = P 58,914$

Solution

$$C_n = C_o \left[\frac{C_L}{C_o} \right]^{\frac{n}{L}}$$

$$5,8914 = C_o \left[\frac{0.06633 (C_o)}{C_o} \right]^{\frac{6}{10}}$$

$$C_o = P 300,049.23 \quad \text{- Not in the choices}$$

94.) An earth moving equipment that cost P90,000 will have an estimated salvage value of P18,000 at the end of 8 years. Using double-declining balance method, compute the book value and the total depreciation at the end of the 5th year.

A. P21,357.42; P68,642.58

B. P24,362.48; P65,637.52

C. P15,830.34; P74,169.66

D. P19,442.78; P70,557.22

Given: $C_o = P 90,000$, $L = 8 \text{ years}$, $n = 5 \text{ years}$, $C_L = P 18,000$

Solution:

$$C_n = C_o \left[1 - \frac{2}{L} \right]^n$$

$$C_5 = 90,000 \left[1 - \frac{2}{8} \right]^5$$

$$C_5 = P 21,357.42$$

$$D_n = C_o - C_n$$

$$D_5 = 90,000 - 21,357.42$$

$$D_5 = P 68,642.58 \quad - \text{Not in the choices}$$

96.) An equipment which cost P200,000 has a useful life of 8 years with a salvage value of P25,000 at the end of its useful life. If the depreciation at the first year is P21,875, what method is used in the calculation of depreciation?

A. Straight Line

B. Declining Balance

C. Sinking Fund

D. Sum of Years Digit

Given: $C_o = P 200,000$, $L = 8 \text{ years}$, $C_L = P 25,000$

Solution:

$$d = \frac{C_o - C_L}{L}$$

$$d = \frac{200,000 - 25,000}{8}$$

$$d = P 21,875 \quad -A$$

98.) The original cost of a certain machine is P150,000 and has an economic life of 8 years with a salvage value of P9,000 at that time. If the depreciation of the first year is equal to P44,475, what method is used in the calculation of the depreciation?

A. Straight Line

B. Declining Balance

C. Sinking Fund

D. Sum of Years Digit

Given: $C_o = P 150,000$, $L = 8 \text{ years}$, $C_L = P 9,000$

Solution:

$$k = 1 - \sqrt[L]{\frac{C_L}{C_o}}$$

$$k = 1 - \sqrt[8]{\frac{9,000}{150,000}}$$

$$k = 0.2964922173$$

$$d_n = C_o(1-k)^{n-1}(k)$$

$$d_n = k C_o$$

$$d_n = 0.2964922173 \times 150,000$$

$$d_n = P 44,473.83 \quad \text{--B}$$

100.) A hydraulic machine cost P180,000 and has a salvage value of P15,000 at the end of its useful life which is 12 years. If the depreciation at the first year is P9,780.71, what method is used in computing the depreciation. Assume money is worth 5% annually.

A. Straight Line

B. Declining Balance

C. Sinking Fund

D. Sum of Years Digit

Given:

$$C_o = P180,000$$

$$C_L = P15,000$$

$$L = 12$$

$$I = 6\%$$

Solution:

$$d = (C_o - C_L) / (F/A, I \%, L)$$

$$= \frac{0.06}{1 + 0.06} \times \frac{12 - 1}{0.06} \times \frac{(180,000 - 15,000)}{0.06}$$

$$d = P9780.709848 \text{ or } P9780.71$$

The answer can only be found if i is 6%.

102.) An equipment costs P480,000 and has a salvage value of 12% of its cost at the end of its economic life of 36,000 operating hours in a period of 5 years. In the first year of service, it was used for 12,000 hours. If at the end of the 2nd year it was used for 15,000 hours, find the depreciation at the second year.

A. P180,000

B. P190,000

C. P160,000

D. P150,000

Solution:

$$C_0 = P480,000$$

$$CL = P480,000(0.12) = P57,600$$

$$H = 36,000 \text{ hours}$$

$$H_2 = 15,000 \text{ hours}$$

$$L = 5$$

$$n = 2$$

$$d_n = \frac{\frac{H}{n} (C_0 - CL)}{H} = \frac{15,000 (480,000 - 57,600)}{36,000} = 176,000$$

$$d_2 = P176,000 \text{ -The answer is not in the options}$$

104.) A lathe machine costs P300,000 brand new with a salvage value of x pesos. The machine is expected to last for 28500 hours in a period of 5 years. In the first year of service it was used for 8000 hours. If the book value at the end of the first year is P220,000, compute for the salvage value x in pesos.

A. P15,000

B. P12,000

C. P18,000

D. P20,000

Solution:

$$C_0 = P300,000$$

$$D = P220,000$$

$$n = 1$$

$$C_1 = P220,000$$

$$\text{Hours used} = 8,000 \text{ hours}$$

$$\text{Useful life} = 28,500 \text{ hours}$$

$$\text{Depreciation} = \text{Original Cost} - \text{Salvage Value} \left(\frac{\text{hours used}}{\text{useful life}} \right)$$

$$\text{Book Value} = \text{Original Cost} - \text{Depreciation}$$

$$P300,000 - \text{Depreciation} = P220,000$$

$$\text{Depreciation} = P80,000$$

$$\left(\frac{8,000}{28,500} \right) (P300,000 - C_L) = P80,000$$

$$C_L = 15,000$$

$$C_L = P15,000$$

106.) A businessman wishes to earn 7% on his capital after payment of taxes. If the income from an available investment will be taxed at an average of 42%, what minimum rate of return, before payment of taxes, must the investment offer to be justified?

A. 13.02%

B. 12.07%

C. 10.89%

D. 11.08%

Solution:

Let r = minimum rate of return

$100\% - 42\% = 58\%$ or 0.58

$0.58 \times r = 7$

$r = 12.06896552$

$r = 12.07$

108.) Froyd Corporation's gross margin is 45% of sales. Operating expenses such as sales and administration are 15% of sales. Froyd Corporation is in 40% tax bracket. What percent of sales is their profit after taxes?

A. 21%

B. 20%

C. 19%

D. 18%

Solution:

Gross Margin = 45%

Expenses = 15%

Taxes = 40%

Gross Margin - Expenses

$= 45\% - 15\%$

$= 30\%$

Profit after taxes

$= 30\% (100\% - 40\%)$

Profit after taxes = 18% of sales

110.) By selling balut at P5 per dozen, a vendor gains 20%. The cost of the eggs rises by 12.5%. If he sells at the same price as before, find his new gain in %.

A. 6.89%

B. 6.67%

C. 6.58%

D. 6.12%

Solution:

Let x = original cost of a dozen of balut

cost + profit = 5

$x + 0.20x = 5$

$1.20x = 5$

$x = 4.17$

Cost per dozen of balut = P4.17

Let Y = new cost of dozen of balut

$Y = 1.125X$

$= 1.125(4.17)$

$$Y = 4.69125 \text{cost} + \text{profit} = 5$$

$$4.69125 + \% \text{gain} (4.69125) = 5$$

$$\% \text{gain} = 0.0658140154$$

$$\% \text{gain} = 6.58\%$$

112.) In a certain department store, the monthly salary of a saleslady is partly constant and partly varies as the value of her sales for the month. When the value of her sales for the month is P10,000.00, her salary for the month is P900.00. When her monthly sales go up to P12,000.00, her monthly salary goes up to P1,000.00. What must be the value of her sales so that her salary for the month will be P2,000.00?

- A. P30,000 B. P31,000 **C. P32,000** D. P33,000

Solution:

Let X = the value of her sales so that her salary for the month will be P2,000.00

$$\frac{10,000 - 12,000}{900 - 1,000} = \frac{10,000 - X}{900 - 2,000} = 32,000$$

$$P = P32,000$$

114.) The selling price of a TV set is double that of its net cost. If the TV set is sold to a customer at a profit of 25% of the net cost, how much discount was given to the customer?

- A. 37.5%** B. 37.9% C. 38.2% D. 38.5%

Solution:

Let x = net cost

Selling price = 2x

Profit = 0.25x

Profit = Selling price - net cost - discount

$$0.25x = 2x - x - \text{discount}$$

$$0.25x = x - \text{discount}$$

$$\text{discount} = 0.75x$$

Discount is 75% of the net cost.

Solving for discount in terms of percent of selling price;

$$\text{discount} = 0.75x / 2x$$

$$\text{discount} = 0.375$$

$$\text{discount} = 37.5\%$$

The discount given to the customer is **37.5%**

116.) The quarrying cost of marble and granite blocks plus delivery cost to the processing plant each is P2,400.00 per cubic meter. Processing cost of marble into tile is P200.00 per square meter and that of the granite into tiles also is P600.00 per square meter. If marble has a net yield of 40 square meters of tile per cubic meter of block and sells P400 per square meter, and granite gives a net yield of 50 square meters of tiles per cubic meter of block and sells at P1000 per square meter. Considering all other costs to be the same, the granite is more profitable than the marble by how much?

A. **P12,000 per cubic meter**

C. P14,000 per cubic meter

B. P13,000 per cubic meter

D. P15,000 per cubic meter

Solution:

For Marble (Per cubic meter):

Quarrying cost & delivery cost to processing plant = 2400

Processing cost into tiles = $[200/\text{sq.m.}](40 \text{ sq.m.}) = 8000$

Total production cost = $2400 + 8000 = 10400$

Total income = $40(400) = 16000$

Profit = Total income - Total production cost

Profit = $16000 - 10400$

Profit = 5600

For Granite (Per cubic meter):

Quarrying cost & delivery cost to processing plant = 2400

Processing cost into tiles = $(600/\text{sq.m.})(50 \text{ sq.m.}) = 30000$

Total production cost = $2400 + 30000 = 32400$

Total income = $50(1000) = 50000$

Profit = Total income - Total production cost

Profit = $50000 - 32400$

Profit = 17600

Solving for the difference in profit per cubic meter.

Difference = $17600 - 5600$

Difference = 12,000

Granite is the more than marble by **12,000 per cubic meter**

118.) A 220 V 2 hp motor has an efficiency of 80%. If power costs P3.00 per kw-hr for the first 50 kw-hr, 2.90 per kw-hr for the second 50 kw-hr, P2.80 for the third kw-hr and so on until a minimum of P2.50 per kw-hr is reached. How much does it cost to run this motor continuously for 7 days?

A. P800
P860

B. P820

C. P840

D.

Solution:

$$\begin{aligned} \text{Efficiency} &= \text{output/input} & 0.80 &= 2/\text{input} & \text{input} &= 2.5 \text{ hP} \\ \text{input} &= 2.5 \text{ hP} (0.746\text{kW/hP}) & \text{input} &= 1.865 \text{ kW} \end{aligned}$$

Let P = total power consumption for 7 days

$$P = 1.865 \text{ kW} (7 \text{ days}) (24 \text{ hours/day}) \quad P = 313.32 \text{ kW-hr}$$

Table of Power Cost:

Consumption (kW-hr)	Rate	Cost
50	3.00	150
50	2.90	145
50	2.80	140
50	2.70	135
50	2.60	130
64	2.50	160

Total Power Cost = P 860.00

It will cost P 860 to run the motor continuously for 7 days

120.) An electric utility purchases 2,300,000 kw-hr per month of electric energy from National Power Corporation at P2.00 per kw-hr and sells all this to consumers after deducting distribution losses of 22%. At what average rate per kw-hr should this energy be sold to break even if the following are other monthly expenses in its operation:

Taxes	2.5% of gross revenue
Salaries	P750000
Depreciation	P2250000
Interest	P700000
Maintenance	P300000
Miscellaneous	P200000

A. P4.90

B. 5.20

C. 5.90

D. 6.30

Solution:

Let x = rate per kw-hr of energy sold to consumers

Solving for Expenses:

$$\text{Amount paid to NPC} = (2/\text{kw-hr})(2300000 \text{ kw-hr}) = 4600000$$

With 22% losses, only 78% is sold to consumers:

$$\text{Total number of kw - hr sold} = 0.78(2300000) = 1794000 \text{ kw-hr}$$

$$\text{Taxes} = 0.025(1794000)(x) = 44850x$$

Total expenses = Amt. paid to NPC + Taxes + Salary + Depreciation + Interest + Maintenance + Miscellaneous

$$\text{Total expenses} = 4600000 + 44850x + 750000 + 2250000 + 700000 + 300000 + 200000$$

$$\text{Total expenses} = 8800000 + 44850x$$

Solving for Income: Income = 1794000x

To break-even; income = expenses

$$1794000x = 8800000 + 44850x$$

X = P5.03 None of the choices

122.) A fixed capital investment of P10,000,000 is required for a proposed manufacturing plant and an estimated working capital of P2,000,000. Annual depreciation is estimated to be 10% of the fixed capital investment. Determine the rate of return on the total investment if the annual profit is P2,500,000.

A. 28.33%

B. 29.34%

C. 30.12%

D. 30.78%

Solution:

$$\text{Rate of Return} = \text{Profit} / \text{Total capital invested}$$

$$2500000 / (10000000 + 2000000) = 0.2083$$

The rate of return is 20.83% - None of the choices

124.) Upon the retirement after 44 years in government service, Mrs. Salud Araoarao was able to get a retirement lump sum of P2,300,000. As a hedge against inflation, she decided to use a part of it invested in real state at Pagadian City and the remainder were invested as follows:

A. 30% in T-bills earning 12% interest

B. 35% in money market placement earning 14%

C. 35% in blue chip stock earning 13%

If her annual earnings from the T-bills, money market and stock is P50,000. How much did she invests in real estate?

A. P2,091,639.12

B. P1,916,858.24

C. P1,856,120.53

D. P1,790,274.78

Solution:

Let x = amount invested in real estate

y = amount invested in T-bills, money market placement and stock
 Since annual income of y is P 50000
 $0.30y(0.12) + 0.35y(0.14) + 0.35y(0.13) = 50000$
 $0.1305y = 50000$
 $y = 383141.76$
 $x = 2300000 - y$
 $x = 2300000 - 383141.76$
 $x = 1916858.24$

The amount she invested in real estate is **P 1,916,858.24**

126.) In a new gold mining area in Southern Leyte the ore contains on the average of ten ounces of gold per ton. Different methods of processing are tabulated as follows:

Processing Method.	Cost per ton.	%Recovery
A.	P5500.	90
B.	P2500.	80
C.	P400.	70

If gold can be sold at P4,000 per ounce, which method of processing yield the biggest return?

- | | |
|-------------------------------|--|
| A. Processing method A | B. Processing method B |
| C. Processing method C | D. Either of the processing methods B or C |

Solution:

For Processing Method A:

Income per ton = $(4000/\text{ounce})(10 \text{ ounces/ton})(0.90) = \text{P}36000$

Net income = $36000 - 5500 = \text{P}30500$

For Processing Method B:

Income per ton = $(4000/\text{ounce})(10 \text{ ounce/ton})(0.80) = \text{P}32000$

Net income = $32000 - 2500 = \text{P}29,500$

For Processing Method C:

Income per ton = $(4000/\text{ounce})(10 \text{ ounce/ton})(0.70) = \text{P}28000$

Net income = $28000 - 400 = \text{P}27600$

Processing Method A yields the biggest return

128.) A paint manufacturing company uses a sand mill for fine grinding of paint with an output of 100 liters per hour using glass beads as grinding media. Media load in the mill is 25 kg costing P200.00 per kg

and is fully replenished in 2 months' time at 8 hours per day operation, 25 days a month. A ceramic grinding media is offered to this paint company, costing P400 per kg and needs 30 kg load in the sand mill, but guarantees an output of 120 liters per hour and full replenishment of media in 3 months. If profit on paint reduction is P15 per liter how much is a difference in profit between the two media?

A. P436,900

B. P462,000

C. P473,000

D. P498,200

Solution:

GLASS BEADS

Total Output in two months' time = (100L/hr.) (8hr./day) (25days/month) (2months)
= 40,000 Liters

Total Income = (P15/L) (40,000 liters)
= P600,000

Total Cost = (P200/kg) (25kg)
= P5,000

Profit = Total Income – Total Cost
= P600,000 – P5,000
= P595,000

CERAMICS

Total Output in two months' time = (120L/hr.) (8hr./day) (25days/month) (3months)
= 72,000 Liters

Total Income = (P15/L) (72,000 liters)
= P1,080,000

Total Cost = (P400/kg) (30kg)
= P12,000

Profit = Total Income – Total Cost
= P1,080,000 – P12,000
= P1,068,000

Difference between two profit = PROFIT OF CERAMICS – PROFIT OF GLAS BEADS
= P1,068,000 – P595,000
= P473,000

Difference in profit between the two media = P473,000

130.) You loan from a loan firm an amount of P100,000 with a rate of simple interest of 20% but the interest was deducted from the loan at the time the money was borrowed. If at the end of one year, you have to pay the full amount of P100,000, what is the actual rate of interest?

A. 23.5%

B. 24.7%

C. 25.0%

D. 25.8%

Given: P= P100,000

i= 20% or 0.20

Solution:

Simple interest on P100,000

P100,000 x 0.20 = P20,000

Loan received at beginning of a year= P100,000 – P20,000 = P80,000

$$\begin{aligned}\text{Actual rate Interest} &= \frac{P\ 100,000 - P\ 80,000}{P\ 80,000} \\ &= 0.25 \text{ or } 25\% \\ \text{Actual interest rate} &= 25\%\end{aligned}$$

132.) If you borrowed money from your friend with simple interest at 12%, find the present worth of P50,000, which is due at the end of 7 months.

- A. **P46,728.97** B. P47,098.12 C. P47,890.12 D. P48,090.21

Given:

$$\begin{aligned}F &= P50,000 \\ n &= 7 \text{ months or } \frac{7}{12} \\ i &= 12\% \text{ or } 0.12 \\ P &= ?\end{aligned}$$

Solution:

$$\begin{aligned}F &= P(1+ni) \\ 50,000 &= P \left(1 + \left(\frac{7}{12}\right)(0.12)\right) \\ P &= \frac{50,000}{1 + \left(\frac{7}{12}\right)(0.12)} \\ &= 46,728.97 \\ \mathbf{P} &= \mathbf{P46,728.97}\end{aligned}$$

134.) If you borrowed P10,000 from a bank with 18% interest per annum, what is the total amount to be repaid at the end of one year?

- A. P10,900 B. P11,200 C. **P11,800** D. P12,000

Given:

$$\begin{aligned}P &= P10,000 \\ n &= 1 \text{ year} \\ i &= 18\% \text{ or } 0.18 \\ F &= ?\end{aligned}$$

Solution:

$$\begin{aligned}F &= P(1+ni) \\ &= 10,000 (1 + 1(0.18)) \\ &= P11,800 \\ \mathbf{F} &= \mathbf{P11,800}\end{aligned}$$

136.) A man borrowed P2,000 from a bank and promised to pay the amount for one year. He received only the amount of P1,920 after the bank collected an advance interest of P80.00. What was the rate of discount?

A. 3.67%

B. 4.00%

C. 4.15%

D. 4.25%

Given:

$$P = P2000$$

$$\text{Advance interest or discount} = P80.00$$

Solution:

$$\begin{aligned} d &= \frac{\text{discount}}{\text{principal}} \\ &= \frac{80}{2000} \\ &= 0.04 \text{ or } 4\% \\ \mathbf{d} &= \mathbf{4.00\%} \end{aligned}$$

138.) What will be the future worth of money after 12 months if the sum of P25,000 is invested today at simple interest rate of 1% per year?

A. P25,168

B. P25,175

C. P25,189

D. P25,250

Given:

$$P = P25,000$$

$$i = 1\% \text{ or } 0.01$$

$$n = 12 \text{ months ; } 12(30) = 36$$

$$F = ?$$

Solution:

$$\begin{aligned} F &= P(1 + ni) \\ &= 25,000 \left(1 + \left(\frac{360}{360} \times 0.01 \right) \right) \\ \mathbf{F} &= \mathbf{P25,250} \end{aligned}$$

140.) It is the practice of almost all banks in the Philippines that when they grant a loan, the interest for one year is automatically deducted from the principal amount upon release of money to a borrower. Let us therefore assume that you applied for a loan with a bank and the P80,000 was approved at an interest rate of 14% of which P11,200 was deducted and you were given a check of P68,800. Since you have to pay the amount of P80,000 one year after, what then will be the effective interest rate?

A. 16.02%

B. 16.28%

C. 16.32%

D. 16.47%

Given:

$$I = P11,200$$

$$P = P68,800$$

$$n = 1$$

$$i = ?$$

Solution:

$$I = Pni$$

$$11,200 = 68,800 (1) (i)$$

$$i = \frac{11,200}{68,800} ; i = 0.1628 \text{ or } 16.28\%$$

$$i = 16.28\%$$

142.) P5,000 is borrowed for 75 days at 16% per annum simple interest. How much will be due at the end of 75 days?

A. P5,066.67

B. P5,133.33

C. P5,050.00

D. P5,166.67

Solution:

$$A = P(1+rt)$$

$$A = P5,000 (1+16\% (75))$$

$$A = \mathbf{P\ 5,166.67}$$

144.) A man borrowed P 20,000 from a local commercial bank which has a simple interest of 16% but the interest is to be deducted from the loan at the time that the money was borrowed and the loan is payable at the end of the one year. How much is the actual rate of interest?

A. 19.05%

B. 19.34%

C. 19.67%

D. 19.87%

Solution:

$$I = 0.16 (20,000)$$

$$= 3,200$$

$$3200 = (20,000 - 3,200) (i) (1)$$

$$i = \mathbf{19.05\%}$$

146.) Agnes Abanilla was granted a loan of P20,000 by her employer CPM Industrial Fabricator and Construction Corporation with an interest rate of 6% for 180 days on the principal collected in advance. The corporation would accept a promissory note for P20,000 non-interest for 180 days. If discounted at once, find the proceeds of the note.

A. P18,800

B. P18,900

C. P19,000

D. P19,100

Solution:

$$\text{Interest} = 0.06(20,000)$$

$$= 1,200$$

$$\text{Proceeds on the note} = 20,000 - 1,200$$

$$= \mathbf{18,800}$$

148.) A man borrowed from a bank under a promissory note that he signed in the amount of P25,000 for a period of one year. He receives only the amount of 21,915.00 after the bank collected the advance interest and an additional of P85.00 for notarial and inspection fees. What was the rate of interest that the bank collected in advance?

A. 13.05%

B. 13.22%

C. 13.46%

D. 13.64%

Solution:

$$\text{Amount Received} = 21,915 + 85$$

$$\text{Amount Received} = 22,000$$

$$\text{Interest} = 25,000 - 22,000$$

$$\text{Interest} = 3,000$$

$$I = Pin$$

$$3,000 = (22,000)(i)(1)$$

$$i = 0.1364$$

$$i = 13.64\%$$

150.) Mr. J. Dela Cruz borrowed money from a bank. He receives from the bank P1,340.00 and promised to pay P1,500.00 at the end of 9 months. Determine the corresponding discount rate of often referred to as the “banker’s discount.”

A. 13.15%

B. 13.32%

C. 13.46%

D. 13.73%

Given:

$$\text{Discount} = P158$$

$$\text{Principal} = P1,500$$

Required:

$$d = \text{rate of discount}$$

$$I = \text{rate of interest}$$

Solution:

$$d = \frac{\text{discount}}{\text{principal}} = \frac{158}{1,500} = 0.1053 \text{ or } 10.53\%$$

$$i = \frac{d}{1-d} = \frac{0.1053}{1-0.1053} = 0.1177 \text{ or } 11.77\% \text{ -Not in the choices}$$

152.) A man borrowed money from a loan shark. He receives from the loan shark and amount of P1,342.00 and promised to repay P1,500.00 at the end of 3 quarters. What is the simple interest rate?

A. 15.475%

B. 15.69%

C. 15.80%

D. 15.96%

Solution:

$$r = (1/0.75) ((1500/1342) - 1) = 0.15697963$$

$$r = 0.15697963$$

Converting r decimal to R a percentage

$$R = 0.15697963 * 100 = 15.698\%/\text{day}$$

Calculating the annual rate

$$15.698\%/\text{day} \times 360 \text{ days/year} = 5651.28\%/\text{year}.$$

154.) The exact simple interest of P5,000 invested from June 21, 1995 to December 25, 1995 is P100. What is the rate of interest?

$$P = \frac{1+i\dot{i}^{n-1}-1}{i\dot{i}} + A$$

$$1,000,000 = \frac{1.06\dot{i}^9-1}{(0.6)\dot{i}} A$$

$$A = \underline{P128,205.13}$$

$$\text{Annual Income} = (100,000) (1.18)$$

$$= \underline{P118,000.00}$$

$$\text{Difference} = 128,205.13 - 118,000.00$$

$$= \underline{P10,205.13}$$

160.) What uniform annual amount should be deposited each year in order to accumulate P100,000.00 at the end of 5th annual deposit if money earns 10% interest?

A. P16,002.18

B. P15,890.12

C. P16,379.75

D. P15,980.12

Solution:

$$F = A\dot{i}^n$$

$$100,000 = X \frac{1+0.10\dot{i}^{10}-1}{\dot{i}}$$

$$X = \underline{16,379.75}$$

162.) Find the present value in pesos, of a perpetuity of P15,000 payable semi-annually if money is worth 8% compounded quarterly.

A. P371,719.52

B. **P371,287.13**

C. P371,670.34

D. P371,802.63

Solution:

$$1 + \frac{r}{m} i^m - 1$$

$$E.I = i$$

$$1 + \frac{0.08}{4}$$

$$= i$$

$$1 + \frac{r}{2} i^r - 1$$

$$r = 0.0808$$

$$P = \frac{A}{i \rightarrow \frac{r}{m}}$$

$$P = \frac{15,000}{\frac{8.08\%}{2}}$$

$$P = \mathbf{P371,287.13}$$

164.) How many years must you invest today in order to withdraw P1,000.00 per year for 10 years if the interest rate is 12%?

A. P5,467.12

B. P5,560.22

C. **P5,650.22**

D. P5,780.12

Solution:

$$1 + i i^{-n}$$

$$1 - i$$

$$P = A i$$

$$1 + 0.12 i^{-10}$$

$$1 - i$$

$$P = 1000 i$$

$$P = \mathbf{P5,650.22}$$

A. 10 B. 11 C. 12 D. 13

$$1 + 0.14i^x - 1$$

$$3,702,939.80 = 100,000i$$

A. P1,590.83 B. 1,609.23 C. P1,778.17 D. P1,827.79

$$A = \frac{50,000}{1 + 2.667i^n - 1}$$

A. P194,089.17 B. P195,780.12 C. P196,801.56 **D. P197,008.25**

$$\begin{aligned} \text{Pmt} &= \text{FV} \left(\frac{i}{(1+i)^n - 1} \right) \\ &= 4,000,000 \left(\frac{.15}{(1+.15)^{10} - 1} \right) \\ &= \mathbf{P197,008.2501} \end{aligned}$$

172.) A man purchased a car with a cash price of P350,000. He was able to negotiate with the seller to allow him to pay only a down payment of 20% and the balance payable in equal 48 end of the month installment at 1.5% interest per month. Once the day he paid the 20th installment, he decided to pay monthly payment. What is the remaining balance that he paid?

A. **P186,927.24** B. P188,225.00 C. P187,701.26 D. P185,900.20

Solution:

$$\text{Total down payment} = P350,000 - (350,000 \times .20)$$

$$P = P280,000$$

$$P = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$280,000 = R \left[\frac{1 - (1+0.015)^{-48}}{0.015} \right]$$

$$R = P8,224.99988 \text{ or } 8225.00$$

$$PV = P280,000$$

$$P = P8,225.00$$

$$r = 1.50\%, n = 20$$

$$FV = \left[PV(1+r)^n \right] - P \left[\frac{(1+r)^n - 1}{r} \right]$$

$$= \left[280,000(1+0.015)^{20} \right] - 8,225 \left[\frac{(1+0.015)^{20} - 1}{0.015} \right]$$

$$\mathbf{FV = P186,927.2399}$$

174.) A car dealer advertises the sale of a car model for a cash price of P280,000. If purchased on installment, the regular down payment is 15% and balance payable in 18 equal monthly installments at an interest rate of 1.5% per month. How much will be required monthly payments?

A. **P15,185.78** B. P15,289.12 C. P15,783.90 D. P15,632.11

Solution:

$$P = P280,000$$

$$\text{Down payment} = P280,000(.15)$$

$$= P42,000$$

$$\text{Total Amount} = \text{Actual Amount} - \text{Down payment}$$

$$P = P280,000 - P42,000$$

$$P = P238,000$$

$$P = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$238,000 = R \left[\frac{1 - (1+0.015)^{-18}}{0.015} \right]$$

$$R = P15,185.7761$$

176.) A company has approved a car plan for its six senior officers in which the company will shoulder 25% of the cost and the difference payable by each officer to a financing company in 48 equal end of the month installments at an interest rate of 1.5% per month. If the cost of each car is P350,000, determine the amount each officer has to pay the financing company per month?

A. P7,523.90

B. P7,619.22

C. P7,190.00

D. P7,710.94

Solution:

Amount Financed by the officers = P350,000(.75)

$$PV = P262,500.00$$

$$I = 1.5\%, n = 48$$

$$PV = \frac{Pmt}{i} \left[1 - \frac{1}{(1+i)^n} \right]$$

$$262,500 = \frac{Pmt}{0.015} \left[1 - \frac{1}{(1+0.015)^{48}} \right]$$

$$Pmt = P7,710.937397$$

178.) An employee is earning P12,000.00 a month and he can afford to purchase a car which will require a down payment of P10,000.00 and a monthly amortization of not more than 30% of his monthly salary. What should be the maximum cash value of a car he can purchase if the seller will agree to a down payment of P10,000.00 and the balance payable in four years at 18% per year payable on monthly basis? The first payment will be due at the end of the first month?

A. P135,267.21

B. P135,507.42

C. P135,605.48

D. P135,807.30

Solution:

Down payment = P10,000

Monthly amortization = P12,000 x 30%

$$=P3,600$$

Using PV factor

$$\left(\frac{1 - \left(\frac{.18}{12} \right)^{-48}}{0.015} \right) = 34.0425$$

Monthly amortization x PV factor

$$3,600 \times 34.0425 = P122,553.1931$$

$$\text{Maximum cash value} = P122,553.1931 + P10,000$$

$$= \mathbf{P132,553.1931 - \text{Not in the choices}}$$

180.) Mr. Juan dela Cruz borrows P100,000 at 10% compounded annually, agreeing to repay the loan in twenty equal annual payments. How much of the original principal is still unpaid after he has made the tenth payment?

A. P69,890.42

B. P72,000.80

C. P72,173.90

D. P72,311.44

Solution:

$$\begin{aligned} \text{Annual Payment, } A &= PV \left[\frac{A}{P}, i\%, n \right] \\ &= 100,000 \left[\frac{A}{P}, 0.10, 20 \right] \end{aligned}$$

$$A = P11,475.96248$$

$$\begin{aligned} \text{Interest Factor } \left(\frac{A}{P}, i\%, n \right) &= \frac{i}{1 - \left(\frac{1}{1+i} \right)^n} \\ &= \frac{0.10}{1 - \left(\frac{1}{1+0.10} \right)^{20}} \end{aligned}$$

$$\text{Interest Factor} = 0.1174596248$$

$$A = P100,000 \times 0.1174596248$$

$$A = P11,475.96248$$

Unpaid Principal after 10th payment

$$\begin{aligned}
&= 100,000 \left[\frac{F}{P}, i\%, n \right] - 11,475.96 \left[\frac{F}{A}, i\%, n \right] \\
&= 100,000 \left[\frac{F}{P}, 0.10, 10 \right] - 11,475.96 \left[\frac{F}{A}, 0.10, 10 \right] \\
&= \mathbf{P72,173.89}
\end{aligned}$$

182.) A fund donated by a benefactor to PICE to provide annual scholarships to deserving CE students. The fund will grant P5,000 for each of the first five years, P8,000 for the next five years and P10,000 each year thereafter. The scholarship will start one year after the fund is established. If the fund earns 8% interest, what is the amount of the donation?

A. P99,490.00

B. P99,507.35

C. P99,601.71

D. P99,723.54

Solution:

$$\text{Using } P = A \left(\frac{P}{A}, i\%, n \right) @ P_1$$

$$P_1 = \text{P } 5,000 \left[\left(\frac{P}{A}, i\%, n \right) \right]$$

$$P_1 = \text{P } 5,000 \left[\left(\frac{P}{A}, 8\%, 5 \right) \right]$$

$$P_1 = \text{P } 19,963.5502$$

$$\text{Using } P = A \left(\frac{P}{A}, i\%, n \right) @ P_2$$

$$P_2 = \text{P } 8,000 \left[\left(\frac{P}{A}, i\%, n \right) \right]$$

$$P_2 = \text{P } 8,000 \left[\left(\frac{P}{A}, 8\%, 5 \right) \right]$$

$$P_2 = \text{P } 31,941.6803$$

$$\text{Using } P = F (1+i)^{-n} @ P_3$$

$$\text{Let } P_3 = F; F = P_2, n = 5$$

$$P = P_3 = 31,941.6803 (1+0.08)^{-5}$$

$$P = P_3 = \text{P } 21,738.9707$$

To solve for P_4 , use $P = \frac{A}{i}$

$$P_4 = \frac{10,000}{0.08}$$

$$P_4 = \text{P}125,000$$

Using present worth (P_4) to solve for P_5

$$P = P_5 = P_4(1+i)^{-n}$$

$$P_5 = 125,000(1+0.08)^{-10}$$

$$P_5 = \text{P}57,899.186$$

Add P_1 , P_3 , and P_5

$$P_1 + P_3 + P_5$$

$$= \text{P}19,963.5502 + \text{P}21,738.9707 + \text{P}57,899.186$$

$$= \text{P}99,601.7071$$

184.) The average annual cost of damages caused by floods at Dona Rosario Village located along Butuanon river is estimated at P700,000. To build a gravity dam to protect the area from the floods, would cost P2,500,000 and would involve an annual maintenance cost of P20,000. With interest at 8% compounded annually, how many years will it take for the dam to pay for itself?

A. 4.0 years

B. 4.5 years

C. 5.0 years

D. 5.5 years

Solution:

$$\text{Investment} = \text{P}2,500,000$$

$$\text{Annual savings from the dam} = \text{P}700,000$$

$$\text{Annual maintenance cost} = \text{P}20,000$$

$$\text{Net Annual Cashflow} = \text{P}700,000 - \text{P}20,000$$

$$= \text{P}680,000$$

$$\text{Payback period} = \frac{\text{Initial investment}}{\text{net annual cashflow}}$$

$$\text{payback period} = \frac{2,500,000}{680,000}$$

$$\text{Payback period} = 4.5 \text{ years}$$

186.) Engr. Rodel Narito agreed to pay the loan he is borrowing from a development bank in six annual end-of-the-year payments of P71,477.70. Interest is 18% per annum compounded annually and is included in the yearly amount he will be paying the bank. How much money Engr. Narito is borrowing from the bank?

A. P250,000
P280,000

B. P260,000

C. P270,000

D.

Solution:

$$PV = \frac{\frac{Pmt}{i}(1+i)^n - 1}{(1+i)^n}$$

$$PV = \frac{\frac{71,477.70}{0.18}(1+0.18)^6 - 1}{(1+0.18)^6}$$

PV= P250,000

188.) Engr. Bacolongan of Main Engineering decided to purchase a machine which is to be used for their refrigeration and air-conditioning works at an amount of P1,200,000. The useful life of the machine is estimated to be 5 years with a salvage value of P80,000 as based on current prices. The average annual rate of inflation during the next 5 years will be 7%. The machine will be replaced with a duplicate and the firm will accumulate the necessary capital by making equal end-of-year deposits in a reserve fund that earns 6% per annum. Determine the annual deposit.

A. P277,189.56

B. P278,664.54

C. P279,180.00

D. P280,673.12

Solution:

$$F = P1,200,000(1+0.06)$$

$$F = P1,272,000$$

$$F1 + P80,000 = P1,272,000$$

$$F1 = P1,192,000$$

$$F1 = A(F/A, 7\%, 5)$$

$$**A = P278,664.54**$$

190.) Because of the peso devaluation, a car costing P150,000 is to be purchased through a finance company instead of paying cash. If the buyer is required to pay P40,000 as down payment and P4,000 each month for 4 years, what is the effective interest rate on the diminishing balance?

A. 35.28%

B. 35.82%

C. 34.89%

D. 34.29%

Solution:

$$\text{Loan amount} = P150,000 - P40,000 = P110,000$$

$$\text{Present Value} = \text{Monthly installment} \times \text{Present value annuity factor (rate, 4 years} \times 12)$$

$$P110,000 = 4,000 \times 48$$

$$\text{Monthly rate} = 2.55\%$$

$$\text{Effective annual rate} = (1 + 2.55\%)^{12} - 1$$

$$\text{Effective annual rate} = 35.28\%$$

192.) Triple J Construction Firm had put up for sale of some of their heavy equipment for construction works. There were two interested buyers submitting their respective bids for the heavy equipment. The bids are as follows:

Buyer A offers P10,000,000 payable 20% down payment, the balance payable P1,000,000 annually for 8 years.

Buyer B offers P9,000,000 payable P2,000,000 down payment, the balance payable P500,000 semi-annually for 7 years.

How much is the difference between the two bids if money is worth 10% effective?

A. P346,520.05

B. P346,980.12

C. P347,019.45

D. P347,733.29

Solution:

@ Buyer A

$$\text{Given: } A = P10,000,000$$

$$i = 20\%$$

$$n = 8 \text{ years}$$

$$F = ?$$

$$F = A (F/A, i\%, n) \quad F = P10,000,000 (F/A, 20\%, 8 \text{ years})$$

$$F = P735,676.75$$

@ Buyer B

$$\text{Given: } A = 9,000,000$$

$$i = 5\%$$

$$n = 14 \text{ years}$$

$$F = ?$$

$$F = A (F/A, i\%, n) \quad F = P9,000,000 (F/A, 5\%, 14 \text{ years})$$

$$F = P365,723.56$$

Difference between the two bids if money is worth 10% effective

$$F = P735,676.75 - P365,723.56$$

$$\mathbf{F = P347,733.29}$$

194.) Froyd Review & Training Center Inc. is expanding its school facilities starting 2001. The program requires the following estimated expenditures:

P1,000,000 at the end of 2001

P1,200,000 at the end of 2002

P1,500,000 at the end of 2003

To accumulate the required funds, it establishes a sinking fund constituting of 15 uniform annual deposits, the first deposit has been made at the end of 1992. The interest rate of the fund is 2% per annum. Calculate the balance in the fund on January 1, 2002.

A. P2,185,902.11

B. P2,195,600.03

C. P2,165,399.54

D. P2,175,380.00

Solution:

Interest rate=2%

Period=15 years

$$\text{future value} = \text{present value}(1+i)^n$$

$$F_{2006} = P1,000,000(1+0.02)^5 + P1,200,000(1+0.02)^4 + P1,500,000(1+0.02)^3$$

$$F_{2006} = P3,994,811.395$$

$$F = \frac{(1+0.02)^{15}}{0.02}$$

$$F = 17.29341692$$

$$\text{Annual deposit } (17.29341692) = P3,994,811.395$$

$$\text{Annual deposit} = P231,001.8555$$

@ Balance in fund after 10 years on January 1, 2002

$$F = \frac{(1+0.02)^{10} - 1}{0.02}$$

$$F = 10.949721$$

$$F = 10.949721 \times P231,001.8555$$

$$F = P2,529,405.868 \text{ -The answer is not found in the choices}$$

196.) Lim Bon Fing Y Hermanos Inc has offered for sale its two-storey building in the commercial district of Cebu City. The building contains two stores on the ground floor and a number of offices on the second floor. A prospective buyer estimates that if he buys this property, he will hold it for about 10 years. He estimates that the average receipts from the rental during this period to be P350,000.00 and the average expenses for all purpose in connection with its ownership and operation (maintenance and repairs, janitorial services, insurance, etc.) to be P135,000.00. He believes that the property can be sold

for a net of P2,000,000 at the end of the 10th year. If the rate of return on this type of investment is 7%, determine the cash price of this property for the buyer to recover his investment with a 7% return before income taxes.

- A. **P2,526,768.61** B. P2,490,156.34 C. P2,390,189.00 D. P2,230,120.56

Given:

$$A = P\ 35,000$$

$$i = 7\% \quad n = 10\ \text{years} \quad P = ?$$

Solution:

$$P = A(P/A, i\%, n) \quad P = P\ 35,000(P/A, 7\%, 10\ \text{years}) \quad P = P\ 2,526,768.61$$

198.) Bicol Hardware Inc. is considering two alternative strategies for a new power tool. According to Jun Ramos who is introducing the power tool, the new product will require an outlay of P30,000 with a low price strategy. The product will generate cash proceeds of P20,000 per year and will have a life to two years. With a high price strategy, the product will generate cash proceeds of P36,000 but will have a life of only one year. The cost of money for the company is 10%. Determine the net present value of the high price strategy.

- A. **P32,727.27** B. P33,737.34 C. P33,747.20 D. P33,757.89

Solution:

Cash proceeds of high price strategy (C) = P 36000

Life = 1 year

$r = 10\%$

Net present value of high price strategy

$$= C / (1+r)$$

$$= 36000 / 1.1$$

$$= P\ 32727.27$$

Net present value of high price strategy = **P 32,727.27**

200.) Engr. Edward Zuela is considering establishing his own business. An investment of P100,000 will be required which must be recovered in 15 years. It is estimated that sales will be P150,000 per year and that annual operating expenses will be as follows:

Materials P40,000

Labor P70,000

Overhead P10,000 + 10% of sales

Selling expenses P5,000

Engr. Zuela will give up his regular job paying P15,000 per year and devote full time to the operation of the business. This will result in decreasing labor cost by P10,000 per year, material cost by P7,000 per year and overhead cost by P8,000 per year. If he expects to earn at least 20% of his capital, is investing in this business a sound idea?

- A. Yes, it is a sound idea
- B. No, it is not a sound idea**
- C. Neither yes nor no because it simply breakeven
- D. It depends on the current demand of the market.

Solution:

Depreciation Value:

$$= 150,000 / [(1+0.2)^{15}-1/0.2]$$

$$= \left(\frac{15,000}{\frac{(1+0.2)^{15}-1}{0.2}} \right)$$

$$= 208.2317976$$

Materials	33,000
Labor	60,000
Overhead	17,000
Selling Expense	5,000
Salary that he will give you	15,000
Depreciation Value	2,08.2317976
TOTAL ANNUAL COST	P 132, 082. 318

Annual Profit

$$= 150,000 - 132,082.318$$

$$= 17,917.682$$

Rate of Return

$$(17,917.682/150,000) \times 100$$

$$= \mathbf{11.95\%}$$

202.) A Civil Engineering student borrowed P2,000.00 to meet college expenses during his senior year. He promised to repay the loan with interest at 4.5% in 10 equal semi-annual installments, the first payment to be made 3 years after the date of the loan. How much will this payment be?

- A. P252.12**
- B. P261.89
- C. P273.90
- D. P280.94

Solution:

$$\text{Semi Annual Interest Rate} = 4.5\%/2 = 2.25\%$$

FV of 2000 after 2.5years

$$\text{PV}[(1+\text{Interest Rate})^{\text{Number of Periods}}]$$

$$= 2000[(1+0.0225)^5] = 2235.36$$

$$\text{EMI} = P \times I \times [(1+i)^n]/[(1+i)^n-1]$$

$$= 2235.36 \times 0.0225 \times [(1+0.0225)^{10}]/[(1+0.0225)^{10}-1]$$

$$50.295496(1.2492)/(1.2492-1)$$

$$=252.12$$

204.) A group of Filipino Mechanical Engineers formed a corporation and the opportunity to invest P8,000,000 in either of the two situations. The first is to expand a domestic operation. It is estimated that this investment would return a net year end cash flow of P2,000,000 each year for 10 years and at the end of that time, the physical assets, which would no longer be needed, could be sold at P5,000,000. The alternative opportunity would involve building and operating a plant in a foreign country. This operation would involve no net cash flow during the first 3 years, but it is believed that, beginning with the end of the fourth year, an annual flow of P4,000,000 would be received, running through the end of the 10th year. After that time, it is believed that the operation and facilities might be expropriated, with little, if any, compensation, being paid. Which of the following is true?

A. Foreign operation yields bigger rate of return.

B. Domestic and foreign operations yield the same rate of return.

C. Domestic operation has double the rate of return of the foreign operation.

D. Foreign operation yields approximately 3% less rate of return than domestic operation.

Solution:

CASE 1

$$\text{Net profit} = 2,000,000 \times 10$$

$$= 20,000,000$$

After 10years of service they will get 5 million. Total Net Cash Flow = 25million

CASE 2

$$\text{Net profit} = 4\text{million} \times 7\text{million}$$

$$= 28,000,000$$

206.) Two sisters, Joan and Jocelyn decided to save money in funds that earns 14% compounded annually but on different ways. Joan decided to save by making an end-of-year deposit of P1,000 on the first year, P1,100 on the second year, P1,210 on the third year and so on increasing the next year's deposit by 10% of the deposit in the preceding year until the end of the 10th year. Jocelyn decided to save by just making an equal deposit of P1,400 annually for 10 years. Who has more savings at the end of 10 years and by how much bigger compared to the other sister?

A. Jocelyn, P671.18

B. Jocelyn, P763.27

C. Joan, P671.18

D. Joan, P763.27

Solution:

Deposit made by Jocelyn:

Where $g = 10\%$, $n = 10$, $i = 14\%$ $A = 1000$

$$PV = A(1 - ((1+g)^n)((1+i)^{-n})) / (i-g)$$

$$= 1000(1 - (1.1^{10})(1.14)^{-10}) / (0.14 - 0.1)$$

$$= 7508.85$$

$$FV = 7508.85(1 + 14\%)^{10}$$

$$= 27837$$

Deposit made by Joan:

$$FV = 1400 (F/A, 14\%, 10) = 1400 (1.14^{10} - 1) / 0.14$$

$$= 27072$$

; If we compare the two FV, **Jocelyn has more savings.**

208.) A manufacturer produces certain items at a labor cost per unit of P315, material cost per unit is P100, variable cost of P3.00 each. If the item has a selling price of P995, how many units must be manufactured each month for the manufacturer to breakeven if the monthly overhead is P461,600?

A. 782

B. 800

C. 806

D. 812

Solution:

Let x = number of units to be manufactured per month

$$995x = 315x + 100x + 3.00x + 461,000$$

$$x = \mathbf{806}$$

210.) A manufacturer produces certain items at a labor cost of P115 each, material cost of P76 each and variable cost of P2.32 each. If the item has a unit price of P600, how many units must be manufactured each month for the manufacturer to break even if the monthly overhead is P428,000.

A. 1,033

B. 1,037

C. 1,043

D. 1,053

Solution:

Let: x = number of units to be manufactured per month

Income = Expenses

$$600x = 115x + 76x + 2.32 + 428,000$$

$$406.68x = 428,000$$

$$x = 1,052.42 \text{ more or less } \mathbf{1,053}$$

212.) XYZ Corporation manufactures bookcases that sell for P65.00 each. It costs XYZ corporation P35,000 per year to operate its plant. This sum includes rent, depreciation charges on equipment, and salary payments. If the cost to produce one bookcase is P50.00, how many cases must be sold each year for XYZ to avoid taking a loss?

A. 2,334

B. 2,443

C. 2,223

D. 2,322

Solution:

Let " x " be the number of cases to be sold each year

Income = Expenses

$$65x = 35x + 35,000$$

$$65x - 35x = 35,000$$

$$30x = 35,000$$

$$x = 35,000/30$$

$$x = 1,166.6667$$

$$\mathbf{x = 1,167 \text{ cases - A}}$$

214.) The annual maintenance cost of a machine is P70,000. If the cost of making a forging is P56 and its selling price is P125 per forged unit. Find the number of units to be forged to breakeven.

A. 1,000

B. 1,012

C. 1,015

D. 1,018

Solution:

Let " x " be the number of units to be forged

Income = Expenses

$$125x = 56x + 70,000$$

$$125x - 56x = 70,000$$

$$69x = 70,000$$

$$x = 70,000/69$$

$$x = 1,014.49$$

$$\mathbf{x = 1,015 \text{ units} - C}$$

216.) Compute the number of blocks that an ice plant must be able to sell per month to break even based on the following data:

Cost of electricity per block – P20.00
 Tax to be paid per block – P2.00
 Real Estate Tax – P3,500.00 per month
 Salaries and Wages – P25,000.00 per month
 Others – P12,000.00 per month
 Selling price of ice – P55.00 per block

A. 1,220

B. 1,224

C. 1,228

D. 1,302

Solution:

Let “x” be the number of blocks to be sold per month

Income = Expenses

$$55x = 20x + 2x + 3,500 + 25,000 + 12,000$$

$$55x - 20x - 2x = 3,500 + 25,000 + 12,000$$

$$33x = 40,500$$

$$x = 40,500/33$$

$$x = 1,227.2727$$

$$\mathbf{x = 1,228 \text{ blocks} - C}$$

218.) General Electric Company which manufactures electric motor has a capacity of producing 150 motors a month. The variable costs are P4,000.00 per month, the average selling price of the motor is P750.00 per motor. Fixed costs of the company amount to P78,000.00 per month which includes all taxes. Determine the number of motors to be produced per month to breakeven.

A. 100

B. 104

C. 110

D. 112

Solution:

Let “x” be the number of motors sold each month

Income = Expenses

1 month basis:

$$750x = 4000 + 78,000$$

$$750x = 82,000$$

$$x = 82,000/750$$

$$x = 109.3333$$

$$x = 110 \text{ motors} - \mathbf{C}$$

220.) A local factory assembling calculators produces 400 units per month and sells them at P1,800 each. Dividends are 8% on the 8,000 shares with par value of P250 each. The fixed operating cost per month is P25,000. Other costs are P1,000 per unit. If 200 units were produced a month, determine the profit or loss.

A. Profit of P121,666.67

B. Profit of P21,666.67

C. Loss of P121,666.67

D. Loss of P21,666.67

Solution:

Let "x" be the number of calculators per month

Income = Expenses

$$1,800x = 1,000x + 25,000$$

$$1,800x - 1,000x = 25,000$$

$$800x = 25,000$$

$$x = 25,000/800$$

$$x = 31.25$$

$$x = 32 \text{ units}$$

$$\text{Dividend} = (250)(0.08)(8,000)/12$$

$$\text{Dividend} = \text{P}13,333.3333 \text{ per month}$$

$$\text{Income} = \text{Total cost} + \text{Dividend} + (\text{Profit/Loss})$$

For 200 units:

$$(1,800)(200) = 25,000 + (1,000)(200) + 13,333 + (\text{Profit/Loss})$$

$$360,000 = 715,000/3 + (\text{Profit/Loss})$$

$$(\text{Profit/Loss}) = 360,000 - 715,000/3$$

$$\text{Profit} = \text{P}121,666.67 \text{ per month} - \mathbf{A}$$

222.) In a steel fabrication shop located somewhere in Cebu, various size rivet holes must be made in structural members. This may be done by laying out the position of the hole on the members and using a drill press for this method, a machinist wage rate is P20.25 per hour and he can drill 27 holes per hour.

An alternative method is by the use of the multiple punch machine. In this process, the machinist wage rate is P20.00 per hour and he can complete 8 holes per minute. This method requires P0.50 per holes to set the multiple punch machine and an installation cost of P2,000.00. If all other costs are the same, for what number of rivet holes will the multiple punch machine pay for itself?

- A. 9,601 B. 9,592 C. 9,581 D. 9,566

Solution:

$$\text{Cost per hole without using machine} = 20.25/27 = 0.75$$

$$\text{Variable cost per hole using machine} = 20/(8*60) + 0.5 = 0.54167$$

$$\text{Difference in variable costs} = 0.75 - 0.54167 = 0.20833$$

$$\text{Number of rivet holes required for multiple punch machine to pay for itself} = 2000/(5/24) = 9600.1536$$

= 9601 holes - A

224.) The Asian Transmission Co. makes and sells certain automotive parts. Present sales volume is 500,000 units per year at a selling price of fifty centavos (P0.50) per unit. Fixed expenses total P80,000.00 per year. What is the present total profit for a year?

- A. P168,000 B. **P170,000** C. P172,000 D. P174,000

Solution:

$$(P0.50)(500,000) = 250,000$$

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

$$\text{Cost} = 80,000$$

$$\text{Profit} = 250,000 - 80,000$$

Profit = P170,000 - B

226.) A factory engaged in the fabrication of an automobile part with a production capacity of 700,000 units per year is only operating at 62% of capacity due to unavailability of the necessary foreign currency to finance the importation of their raw materials. The annual income is P430,000.00. Annual fixed costs are P190,000.00 and the variable costs are P0.348 per unit. What is the current profit or loss?

- A. P87,450 B. **P88,960** C. P88,450 D. P87,960

Solution:

$$\text{Number of units being produced} = (0.62)(700,000) = 434,000$$

$$\text{Total cost} = \text{FC} + \text{VC}$$

$$= 190,000 + (434,000)(0.348)$$

$$= 341,032$$

$$\text{Total Revenue} = 430,000$$

$$\text{Profit} = \text{TR} - \text{TC}$$

$$= 430,000 - 341,032$$

$$\text{Profit} = \text{P88,968} - \text{B}$$

228.) A certain firm has the capacity to produce 650,000 units of product per year. At present, it is operating at 62% capacity. The firm's annual income is P4,160,000.00. Annual fixed costs are P1,920,000.00 and the variable costs are equal to P3.56 per unit of product. What is the firm's annual profit or loss?

A. P814,320

B. P815,230

C. P816,567

D. P817,239

Solution:

$$\begin{aligned} \text{Total unit currently producing} &= 650,000 \times 0.62 \\ &= 403,000 \end{aligned}$$

$$\text{Price per unit} = \frac{4,160,000}{403,000}$$

$$= 10.32$$

$$\text{Profit} = \text{TR} - \text{TC}$$

$$\text{Profit} = 4,160,000 - 1,920,000 - 403,000(3.56)$$

$$= 805,320 - \text{Not in the choices}$$

230.) A small shop in Bulacan fabricates threshers for palay producers in the locality. The shop can produce each thresher at a labor cost of P1,800.00. The cost of materials for each unit is P2,500.00. The variable costs amount to P650.00 per unit while fixed charges incurred per annum totals P69,000.00. If the portable threshers are sold at P7,800.00 per unit, how many units must be produced and sold per annum to breakeven?

A. 28

B. 25

C. 26

D. 27

Solution:

Let n = number of units must be produced and sold per annum to breakeven

Total Income = Total Cost

$$7,800 = 69,000 + (650 + 2,500 + 1,800)n$$

$$n = 25 \text{ units}$$

232.) The following data for year 2000 are available for Cagayan Automotive Company which manufactures and sells a single automotive product line:

Unit selling price – P40.00

Unit variable cost – P20.00

Unit contribution margin – P20.00

Total fixed costs – P200,000.00

What is the breakeven point in units for the current year?

A.10,000

B. 10,100

C. 10,050

D. 10,200

Solution:

$$\text{Breakeven point} = \frac{\text{fixed costs}}{(\text{price} - \text{variable costs})}$$

$$\text{Breakeven point} = \frac{200,000}{(40 - 20)}$$

$$\text{Breakeven point} = 10,000 \text{ units} \quad \text{-A}$$

234.) An item which can be sold for P63.00 per unit wholesale is being produced with the following cost data:

Labor cost – P10.00 per unit

Material cost – P15.00 per unit

Fixed charges – P10,000.00

Variable cost – P8.00 per unit

What is the breakeven point sales volume if one out of every 10 units produced is defective and is rejected with only full recovery on materials?

A. P25,011

B. P25,111

C. P25,121

D. P25,132

Solution:

Cost forgone= (labor cost + variable cost) = (10+8) = P 18

18/9= 2

Sales price 63

Less Variable cost -8

Less Labor cost -10

Less Material Cost -15

Less Cost of defective items -2

Fixed cost 10,000

Contribution per unit 28

BEP = 10,000/28 = 357.1429

BEP= 357.1429+357.1429/9= 396.825 or 397 units

397(63) = **P25,011**