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Engineering Economics
Assignment # 3rd.

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Question # 3.1:

Solution:

Principal amount, $P = 10,000$ \$

Interest rate per anum, $i = 12\%$

Time in years, $N = 6 + 0.25$

Intrest, $I = P \cdot i \cdot N$

$= 10,000 \times \frac{12}{100} \times 6.25$

$= 7500$ \$.

Question # 3.2

Solution:

Principal amount, $P = 10,500$

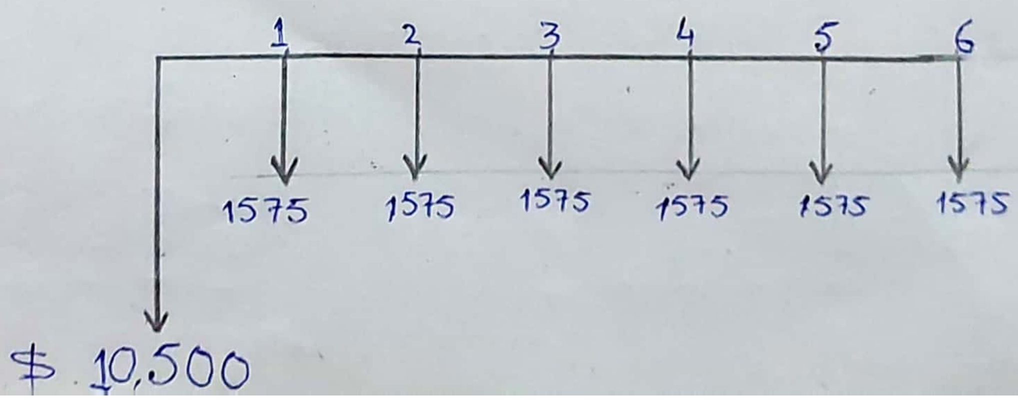
Interest rate, $i = 15\%$.

Time in years, $N = 6$

Intrest, $I = P \cdot i \cdot N$

$= 10500 \times 0.15 \times 6$

$= 9450$ \$.



Question # 3.3:

Solution:

$P = 1000\ \$$, $N = 2.5$ years

$i = 6\%\ \$/year$

$$F = P(1 + iN)$$
$$= 1000(1 + 0.06 \times 2.5)$$
$$= 1000(1.15)$$
$$= 1150\ \$$$

Question # 3.4.

Solution:

For first three years:

$P = 2000\ \$$, $N = 3$ years

$i = 0.1\ \$/year$

$$I_1 = 2000 \times 0.1 \times 3$$
$$= 600\ \$$$

For Last three years: $P = 1000\ \$$

$$I_2 = 1000 \times 0.1 \times 3$$
$$= 300\ \$$$

Total Interes $I = I_1 + I_2 = 900\ \$$

Question # 3.5:

Solution:

For compound interest in first

three years, $P_1 = 2000\$$

$$I_1 = P_1(1+i)^N$$

$$= 2000(1+0.1)^3 = 2000 \times 1.331$$

$$= 2662\ \$$$

For remaining three years, $P_2 = 1000\$$

$$I_2 = P_2(1+i)^N$$

$$= 1000(1+0.1)^3 = 1000 \times 1.331$$

$$= 1331\ \$$$

Total interest $I_c = I_1 + I_2 = 3993\ \$$

Now difference in simple and Compound Intrest, $d = I_c - I_s = 3993 - 900$

$$= 3093\ \$$$

Question # 3.9

Solution:

To calculate the annual payment needed to reach a future value, $F = 10{,}000\ \$$ with an annual intrest rate of $i = 5\%$ over $N = 15$ years, we can use the below formula.

$$F = P\left(\frac{(1+i)^N - 1}{i}\right)$$

$$P = \frac{F \cdot i}{(1+i)^N - 1}$$

$$= \frac{10{,}000 \times 0.05}{(1.05)^{15} - 1}$$

$$= 463.4229\ \$$$

Question # 3.10:

Solution:

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

$$= 1500(1+0.12)^8 = 1500 \times (1.12)^8$$

$$= 1500 \times 2.476$$

$$= 3713.94 \$$$

Question # 3.11:

Solution:

We'll use annuity payment formula.

$$P_{mt} = \frac{P_v \cdot i \cdot (1+i)^N}{(1+i)^N - 1}$$

$$= \frac{20{,}000 \times 0.1 \times (1.1)^5}{(1.1)^5 - 1}$$

$$= 5275.9496 \$$$

Question # 3.12:

Solution:

In this scenario where \$20000 is to be repaid at the rate of \$4000 per year plus interest based on the begining of year unpaid principal, the total amount of interest repaid will be different from the previous scenario where equal annual payments were made.

20'000 × 0.1	=	2000	
16'000 × 0.1	=	1600	
12'000 × 0.1	=	1200	
8'000 × 0.1	=	800	
4'000 × 0.1	=	400	
		6'000	$

Question # 3.13:

Solution:

To determine the annual payment needed to accumulate $2'500 over 7 years ~~to accumulate~~ with an 8% annual interest rate, we use the annuity formula.

$$\text{annual payment } P_{mt} = \frac{F_v \times i}{(1+i)^N - 1}$$

$$P_{mt} = \frac{2'500 \times 0.08}{(1.08)^7 - 1}$$

$$= 280.181'0 \ \$$$

Question # 3.14:

Solution:

Using formula for Compound Interest:

$$F_v = P_v \times (1+i)^N$$

$$\frac{F_v}{P_v} = (1+i)^N = 1+i = \sqrt[N]{\frac{F_v}{P_v}}$$

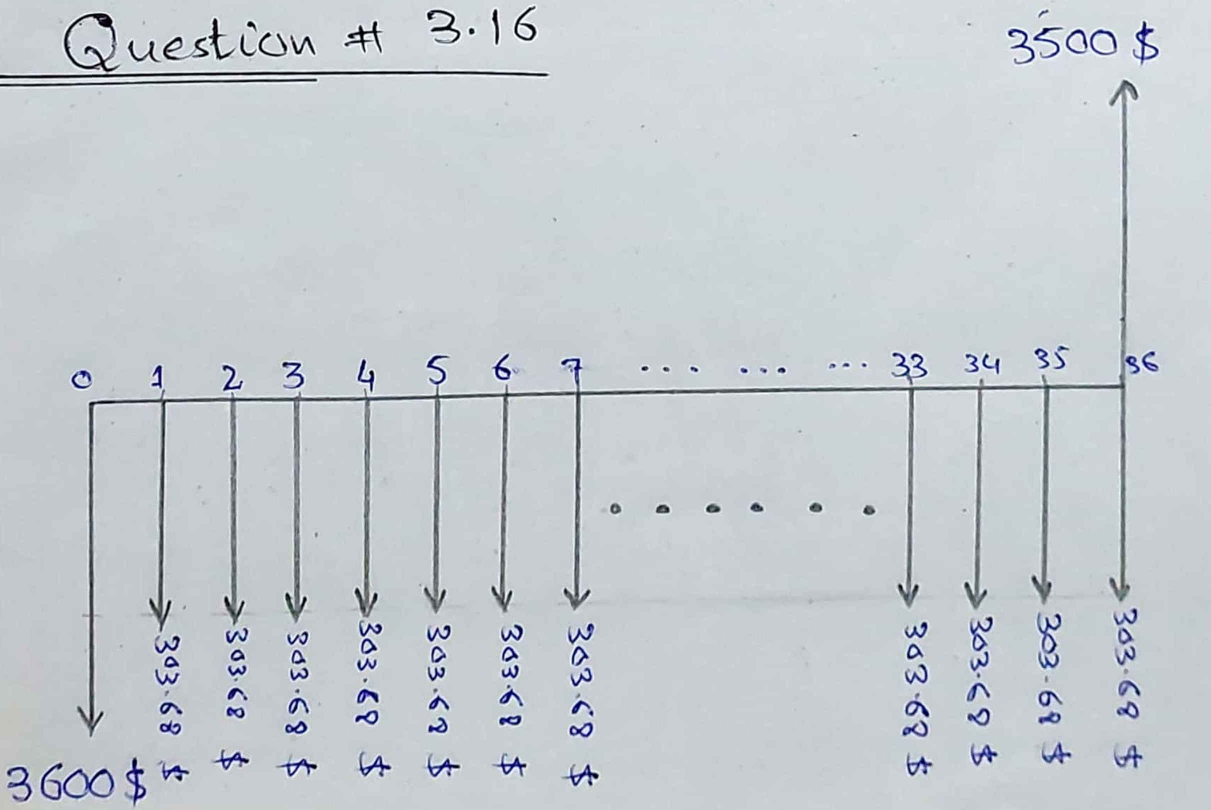
$$i = \sqrt[N]{\frac{F_v}{P_v}} - 1$$

$$i = \sqrt[8]{\frac{1000}{350}} - 1$$

$$= 0.1402$$

$$i = 14.02\%$$

Question # 3.16



Question # 3.17:

Solution:

$$P_{mt} = \frac{P_v \times i \times (1+i)^N}{(1+i)^N - 1}$$

$$= \frac{25000 \times 0.12 \times (1+0.12)^{10}}{(1+0.12)^{10} - 1}$$

$$= 4424.6041 \ \$$$

THE END.