Chapter 2. Compound Interest (Without using formula)

Exercise 2(A)

Solution 1:

(i) Principal for 1st year = Rs. 3500
R = 10%

Interest for 1st year = $\frac{3500 \times 10 \times 1}{100}$

= Rs. 350

Amount after 1st year = Rs. 3500 + 350
= Rs. 3850

Principal for 2nd year = 3850

Interest for 2nd year = $\frac{3850 \times 10 \times 1}{100} = 385$

Amount after 2nd year = 3850 + 385
= 4235

Compound interest = 350 + 385
= Rs. 735

(ii) Principal for 1st year = Rs. 6000
R = 5%

Interest for 1st year = $\frac{6000 \times 5 \times 1}{100} = \text{Rs. } 300$

Amount after 1st year = 6000 + 300 = 6300

Principal for 2nd years = Rs. 6300

Interest for 2nd year = $\frac{63000 \times 5 \times 1}{100} = \text{Rs. } 315$

Amount after 2nd year = 6300 + 315 = Rs. 6615

Principal for 3rd year = 6615

Interest for 3nd year = $\frac{6615 \times 5 \times 1}{100}$

Amount after 3rd year = $\frac{33075}{100} = 330.75.$

= 6615 + 330.75 = Rs. 6945.75

Compound interest = 300 + 315 + 330.75
= Rs. 945.75

Solution 2:

(i) for 1^{st} year

P = Rs. 8000

R = 15%

T = 1 year.

Interest = $\frac{8000 \times 15 \times 1}{100} = Rs.1200$

Amount = 8000 + 1200 = Rs. 9200

For 2^{nd} year.

P = Rs. 9200,R = 15%, T = 1 year.

$I = \frac{9200 \times 15 \times 1}{100} = Rs.1380$

Amount = 9200 + 1380 = 10580

For final $\frac{1}{2}$ year

P = Rs. 10580, R = 15%,T = $\frac{1}{2}$ year

$I = \frac{10580 \times 15 \times 1}{100 \times 2} = \frac{79350}{100} = 793.50$

Amount = 10580 + 793.50

= Rs. 11373.50

Amount in $2\frac{1}{2}$ years = Rs. 11373.50

P = 8000

Compound interest = 11373.50 - 8000

= Rs. 3373.50

(ii) for 1^{st} years

P = Rs. 20000,R = 10%,T = 1 year

Interest (I) = $\frac{20000 \times 10 \times 1}{100} = Rs.2000$

Amount (A) = 20000 + 2000
= Rs. 22,000 for 2nd year =

P = Rs. 22000,R = 10%,and T = 1 year.

$$I = \frac{22000 \times 10 \times 1}{100} = Rs.2200$$

A = 22000 + 2200 = Rs. 24200
For final $\frac{1}{4}$ th fo year.

P = 24200,R = 10%,T = $\frac{1}{4}$ year

$$I = \frac{24200 \times 10 \times \frac{1}{4}}{100 \times 4} = \frac{60500}{100} = Rs.605$$

A = 24200 + 605 = Rs. 24805.
Amount in $2\frac{1}{4}$ years. = Rs. 24805.
Compound interest = 24805 - 20000
= Rs. 4805

Solution 3:

(i)
For 1st year
P = Rs. 4600
R = 10%
T = 1 year.

$$I = \frac{4600 \times 10 \times 1}{100} = Rs.460$$

A = 4600 + 460 = Rs. 5060
For 2nd year
P = Rs. 5060
R = 12%
T = 1 year.

$$I = \frac{5060 \times 12 \times 1}{100} = \frac{60720}{100} = 607.20$$

A= 5060 + 607.20 = Rs. 5667.20
Compound interest = 5667.20 - 4600
= Rs. 1067.20
Amount after 2 years = Rs. 5667.20
(ii)
For 1st year
P = Rs. 16000
R = 10%
T = 1 year

$$I = \frac{16000 \times 10 \times 1}{100} = Rs.1600$$

A = 16000 + 1600 = 17600
For 2nd year,
P = Rs. 17600
R = 14%

$$I = \frac{17600 \times 14 \times 1}{100} = \frac{246400}{100} = Rs.2464.$$

A = 1760 + 24654 = Rs. 20064
For 3rd year,
P = Rs. 20064
R = 15%
T = 1 year

$$I = \frac{20064 \times 15 \times 1}{100} = 3009.60$$

Amount after 3 years = 20064 + 3009.60
= Rs. 23073.60
Compound interest = 23073.60 - 16000
= Rs. 7073.60

Solution 4:

For 1st years
P = Rs. 2400
R = 5%
T = 1 year

$$I = \frac{2400 \times 5 \times 1}{100} = 120$$

A = 2400 + 120 = Rs. 2520
For 2nd year
P = Rs. 2520
R = 5%
T = 1 year

$$I = \frac{2520 \times 5 \times 1}{100} = Rs.126$$

A = 2520 + 126 = Rs. 2646
For final $\frac{1}{2}$ year,
P = Rs. 2646
R = 5%
T = $\frac{1}{2}$ year

$$I = \frac{2646 \times 5 \times 1}{100 \times 2} = Rs.66.15$$

Amount after $2\frac{1}{2}$ years = 2646 + 66.15
= Rs. 2712.15
Compound interest = 2712.15 - 2400
= Rs. 312.15

Solution 5:

For 1st year
P = Rs. 8000
R = 10%
T = 1 year

$$I = \frac{8000 \times 10 \times 1}{100} = 800$$

A = 8000 + 800 = Rs. 8800
For 2nd year
P = Rs. 8800
R = 10%
T = 1 year

8800 × 10 × 1

Solution 6:

For 1st year
P = Rs. 2500
R = 12%
T = 1 year

$$I = \frac{2500 \times 12 \times 1}{100} = Rs.300$$

Amount = 2500 + 300 = Rs. 2800
For 2nd year
P = Rs. 2800
R = 12%
T = 1 year

$$I = \frac{2800 \times 12 \times 1}{100} = Rs.336$$

Amount = 2800 + 336 = Rs. 3136
Amount repaid by A to B = Rs. 2936
The amount of watch =Rs. 3136 - Rs. 2936 = Rs. 200

Solution 7:

$$\text{Interest for the first year} = \frac{P \times R \times T}{100}$$
$$= \frac{50,000 \times 6 \times 1}{100}$$
$$= Rs.3,000$$

Amount for the first year = Rs. 50, 000 + Rs. 3, 000 = Rs. 53, 000

$$\text{Interest for the second year} = \frac{P \times R \times T}{100}$$
$$= \frac{53,000 \times 8 \times 1}{100}$$
$$= Rs.4,240$$

Amount for the second year = Rs. 53, 000 + Rs. 4, 240 = Rs. 57, 240

$$\text{Interest for the third year} = \frac{P \times R \times T}{100}$$
$$= \frac{57,240 \times 10 \times 1}{100}$$
$$= Rs.5,724$$

Amount for the third year = Rs. 57, 240 + Rs. 5, 724 = Rs. 62, 964
Hence, the amount will be Rs. 62, 964.

Solution 8:

Interest for the first year $= \frac{P \times R \times T}{100}$

$= \frac{75,000 \times 15 \times 1}{100}$

$= Rs.11,250$

Amount for the first year $= Rs.75,000 + Rs.3,000 = Rs.86,250$

Interest for the second year $= \frac{P \times R \times T}{100}$

$= \frac{86,250 \times 15 \times 1}{100}$

$= Rs.12,937.5$

Amount for the second year $= Rs.86,250 + Rs.12,937.5 = Rs.99,187.5$

Interest for the third year $= \frac{P \times R \times T}{100}$

$= \frac{99,187.5 \times 16 \times 1}{100}$

$= Rs.15,870$

Amount for the third year $= Rs.99,187.5 + Rs.15,870 = Rs.1,15,057.5$

Hence, the sum Meenal will get at the end of the third year is Rs.1,15,057.5.

Solution 9:

To calculate S.I.

P=Rs18,000; R=10% and T=1year

S.I.= Rs $\frac{18,000 \times 10 \times 1}{100}$ = Rs1,800

To calculate C.I.

For 1st half- year

P= Rs18,000; R=10% and T= 1/2year

Interest= Rs $\frac{18,000 \times 10 \times 1}{100 \times 2}$ = Rs900

Amount= Rs18,000+ Rs900= Rs18,900

For 2nd year

P= Rs18,900; R= 10% and T= 1/2year

Interest= Rs $\frac{18,900 \times 10 \times 1}{100 \times 2}$ = Rs945

Amount= Rs18,900+ Rs945= Rs19,845

∴ Compound interest= Rs19,845- Rs18,000= Rs1,845

∴ His gain= Rs1,845 - Rs1,800= Rs45

Solution 10:

Interest for the first year $= \frac{P \times R \times T}{100}$

$= \frac{4,000 \times 8 \times 1}{100}$

$= Rs.320$

Amount for the first year $= Rs.4,000 + Rs.320 = Rs.4,320$

Interest for the second year $= \frac{P \times R \times T}{100}$

$= \frac{4,320 \times 10 \times 1}{100}$

$= Rs.432$

Amount for the second year $= Rs.4,320 + Rs.432 = Rs.4,752$

Interest for the third year $= \frac{P \times R \times T}{100}$

$= \frac{4,752 \times 10 \times 1}{100}$

$= Rs.475.20$

Amount for the third year $= Rs.4,752 + Rs.475.20 = Rs.5,227.20$

So, the compound interest $= Rs.\ 5,227.20 - Rs.4,000 = Rs.1,227.20$

Hence, the sum Meenal will get at the end of the third year is Rs.1,227.20.

Exercise 2(B)

Solution 1:

For 1^{st} year

P = Rs. 4000

R = 8

T = 1 year

$I = \frac{4000 \times 8 \times 1}{100} = 320$

A = 4000 + 320 = Rs. 4320

For 2^{nd} year

P = Rs. 4320

R=8%

T = 1 year

$I = \frac{4320 \times 8 \times 1}{100} = Rs.345.60$

A = 4320 + 345.60 = 4665.60

Compound interest = Rs. 4665.60 - Rs. 4000

= Rs. 665.60

Simple interest for 2 years $= \frac{4000 \times 8 \times 2}{100}$

= Rs. 640

Difference of CI and SI = 665.60 - 640

= Rs 25.60

Solution 2:

For 1st year
P = Rs. 12500
R = 12%
R = 1 year

$$I = \frac{12500 \times 12 \times 1}{100} = Rs.1500$$

A = 12500 + 1500 = Rs. 14000
For 2nd year
P = Rs. 1400
R = 15%
T = 1 year

$$I = \frac{14000 \times 15 \times 1}{100} = Rs.2898$$

A = 1400 + 2100 = Rs. 16100
For 3rd year
P = Rs. 16100
R = 18%
T = 1 year

$$I = \frac{16100 \times 18 \times 1}{100} = Rs.2898$$

A = 16100 + 2898 = Rs. 3998
Difference between the compound interest of the third year and first year
= Rs. 2893 - Rs. 1500
= Rs. 1398

Solution 3:

Let money be Rs100
For 1st year
P=Rs100; R=8% and T= 1year

Interest for the first year= Rs $\frac{100 \times 8 \times 1}{100}$ = Rs8

Amount= Rs100+ Rs8= Rs108
For 2nd year
P=Rs108; R=8% and T= 1year

Interest for the second year= Rs $\frac{108 \times 8 \times 1}{100}$ = Rs8.64

Difference between the interests for the second and first year = Rs8.64 - Rs8 = Rs0.64
Given that interest for the second year exceeds the first year by Rs.96
When the difference between the interests is Rs0.64, principal is Rs100

When the difference between the interests is Rs96, principal=Rs $\frac{96 \times 100}{0.64}$ =Rs15,000

Solution 4:

Given that the amount for the first year = Rs. 5, 000

Rate per annum = 12%

Interest on Rs. 5, 000 = $\frac{12}{100}$ x Rs. 5, 000 = Rs. 600

So, amount at the end of the first 6 months

= Rs. 5, 000 + Rs. 600

= Rs. 5, 600

Amount left to be paid = Rs. 5, 600 – Rs. 1, 800

= Rs. 3, 800

Interest on Rs. 3, 800 = $\frac{12}{100}$ x Rs. 3, 800 = Rs. 456

So, amount at the end of the next 6 months

= Rs. 3, 800 + Rs. 456

= Rs. 4, 256

Amount left to be paid = Rs. 4, 256 – Rs. 1, 800

= Rs. 2, 456

Interest on Rs. 2, 456 = $\frac{12}{100}$ x Rs. 2, 456 = Rs. 294.72

So, amount at the end of the next 6 months

= Rs. 2, 456 + Rs. 294.72

= Rs. 2750.72

Hence, the third payment he has to make at the end of 18 months in order to clear the entire loan is Rs. 2750.72.

[*Note: The solution has been solved as per the question [that is rate per 6 months].

However, the answer at the back is solved with 'rate per annum'.

So, the answers do not match.]

Solution 5:

Given that the amount borrowed = Rs. 6, 000

Rate per annum = 5%

Interest on Rs. 6, 000 = $\frac{5}{100}$ x Rs. 6, 000 = Rs. 300

So, amount at the end of the first year

= Rs. 6, 000 + Rs. 300

= Rs. 6, 300

Amount left to be paid = Rs. 6, 300 - Rs. 1, 200

= Rs. 5, 100

Interest on Rs. 5, 100 = $\frac{5}{100}$ x Rs. 5, 100 = Rs. 255

So, amount at the end of the second year

= Rs. 5, 100 + Rs. 255

= Rs. 5, 355

Amount left to be paid = Rs. 5, 355 - Rs. 1, 200

= Rs. 4, 155

Hence, the amount of the loan outstanding at the beginning of the third year is Rs. 4, 155.

Solution 6:

Let principal (p = Rs. 100
R = 10%
T = 1 year

$$SI = \frac{100 \times 10 \times 1}{100} = Rs.10$$

Compound interest payable half yearly
R = 5% half yearly
T = $\frac{1}{2}$ year = 1 half year
For first $\frac{1}{2}$ year

$$I = \frac{100 \times 5 \times 1}{100} = Rs.5$$

A = 100 + 5 = Rs. 105
For second $\frac{1}{2}$ year
P = Rs. 105

$$I = \frac{105 \times 5 \times 1}{100} = Rs.5.25$$

Total compound interest = 5 + 5.25
= Rs. 10.25
Difference of CI and SI = 10.25- 10
= Rs. 0.25
When difference in interest is Rs. 10.25, sum = Rs. 100

If the difference is Rs. 1 ,sum = $\frac{100}{0.25}$

If the difference is Rs. = 180,sum = $\frac{100}{0.25} \times 180$

= Rs. 72000

Solution 7:

Let the original cost of the machine = Rs. 100
∴ Depreciation during the 1st year = 15% of Rs. 100 = Rs. 15
Value of the machine at the beginning of the 2nd year
= Rs. 100 – Rs. 15
= Rs. 85
∴ Depreciation during the 2nd year = 15% of Rs. 85 = Rs. 12.75
Now, when depreciation during 2nd year = Rs. 12.75, original cost = Rs. 100
⇒ when depreciation during 2nd year = Rs. 5,355

original cost = Rs. $\frac{100}{12.75} \times 5,355$ = Rs. 42,000

Hence, original cost of the machine is Rs. 42,000.

Solution 8:

(i) For 1^{st} years
P = Rs. 5600
R = 14%
T = 1 year

$$I = \frac{5600 \times 14 \times 1}{100} = Rs.784$$

(ii) Amount at the end of the first year
= 5600 + 784
= Rs. 6384
(iii) For 2^{nd} year
P = 6384
R = 14%
R = 1 year

$$I = \frac{6384 \times 14 \times 1}{100}$$

= Rs. 803.76
= Rs. 894 (nearly)

Solution 9(i):

The principal, P = Rs. 48,000

$$\text{Interest for the first year} = \frac{P \times R \times T}{100}$$

$$= \frac{48,000 \times 10 \times 1}{100}$$

$$= Rs.4,800$$

So, amount at the end of the first year
= Rs. 48,000 + Rs. 4,800
= Rs. 52,800

$$\text{Interest for the second year} = \frac{P \times R \times T}{100}$$

$$= \frac{52,800 \times 10 \times 1}{100}$$

$$= Rs.5,280$$

So, amount at the end of the second year
= Rs. 52,800 + Rs. 5,280
= Rs. 58,080

$$\text{Interest for the third year} = \frac{P \times R \times T}{100}$$

$$= \frac{58,080 \times 10 \times 1}{100}$$

$$= Rs.5,808$$

Hence, the difference between the interest for the second and third year is
Rs. 5,808 – Rs. 5,280 = Rs. 528.

Solution 9(ii):

Interest for the first year $= \frac{P \times R \times T}{100}$

$= \frac{50,000 \times 10 \times 1}{100}$

$= Rs.5,000$

Amount at the end of the first year

$= Rs.\ 50,000 + Rs.\ 5,000$

$= Rs.\ 55,000$

Interest for the second year $= \frac{P \times R \times T}{100}$

$= \frac{55,000 \times 12 \times 1}{100}$

$= Rs.6,600$

Amount at the end of the second year

$= Rs.\ 55,000 + Rs.\ 6,600$

$= Rs.\ 61,600$

Interest for the third year $= \frac{P \times R \times T}{100}$

$= \frac{61,600 \times 14 \times 1}{100}$

$= Rs.8,624$

Total of the interests earned during first and third years

$= Rs.\ 5,000 + Rs.8,624$

$= Rs.\ 13,624$

Solution 10:

Savings at the end of every year = Rs. 3000

For 2nd year

P = Rs. 3000

R = 10%

T = 1 year

$I = \frac{3000 \times 10 \times 1}{100} = 300$

A = 3000 + 300 = Rs. 3300

For third year, savings = 3000

P = 3000 + 3300 = Rs. 6300

R = 10%

T = 1 year

$I = \frac{6300 \times 10 \times 1}{100} = Rs.630$

A = 6300 + 630 = Rs. 6930

Amount at the end of 3rd year

= 6930 + 3000

= Rs. 9930

Solution 11:

The amount borrowed = Rs. 10, 000

Interest for the first year $= \frac{P \times R \times T}{100}$

$= \frac{10,000 \times 5 \times 1}{100}$

= Rs. 500

So, amount at the end of the first year

= Rs. 10, 000 + Rs. 500

= Rs. 10, 500

The man pays 35% of Rs. 10, 500 at the end of the first year

$= \frac{35}{100} \times 10,500$ = Rs. 3, 675

So, amount left to be paid

= Rs. 10, 500 – Rs. 3, 675 = Rs. 6, 825

Interest for the second year $= \frac{P \times R \times T}{100}$

$= \frac{6,825 \times 5 \times 1}{100}$

= Rs. 341.25

So, amount at the end of the second year

= Rs. 6, 825 + Rs. 341.25

= Rs. 7, 166.25

The man pays 42% of Rs. 7166.25 at the end of the second year

$= \frac{42}{100} \times 7166.25$ = Rs. 3,009.825

So, amount left to be paid

= Rs. 7, 166.25 – Rs. 3, 009.825 = Rs. 4, 156.425

Interest for the third year $= \frac{P \times R \times T}{100}$

$= \frac{4,156.425 \times 5 \times 1}{100}$

= Rs. 207.82125

So, amount at the end of the third year

= Rs. 4, 156.425 + Rs. 207.82125

= Rs. 4, 364.24625

Hence, he must pay Rs. 4, 364.24625 at the end of the third year in order to clear the debt.

Solution 12:

For 1st year

P= Rs8,000; R=10% and T= 1year

Interest= Rs $\frac{8000 \times 10 \times 1}{100}$ = Rs800

Amount= Rs8,000+ Rs800=Rs8,800

For 2nd year

P= Rs8,800+Rs8,000=Rs16,800; R=10% and T= 1year

Interest= Rs $\frac{16,800 \times 10 \times 1}{100}$ = Rs1,680

Amount= Rs16,800 + Rs1,680= Rs18,480

∴ Total saving at the beginning of 3rd year

=Rs18,480+ Rs8,000

=Rs26,480 Ans.

Exercise 2(C)

Solution 1:

$$\text{Rate of interest} = \frac{\text{Difference in the interest of the two consecutive periods} \times 100}{\text{C.I. of preceeding year} \times \text{Time}}\%$$

$$= \frac{(7410 - 5700) \times 100}{5700 \times 1}\%$$

$$= 30\%$$

Solution 2:

∵ Difference between the C.I. of two successive half-years

= Rs760.50 - Rs650= Rs110.50

⇒Rs110.50 is the interest of one half-year on Rs650

∴ Rate of interest= Rs $\frac{100 \times I}{P \times T}$ %= $\frac{100 \times 110.50}{650 \times \frac{1}{2}}$ %= 34%

Solution 3:

(i)Amount in two years= Rs5,292

Amount in three years= Rs5,556.60

∵ Difference between the amounts of two successive years

= Rs5,556.60 - Rs5,292= Rs264.60

⇒Rs264.60 is the interest of one year on Rs5,292

∴ Rate of interest= Rs $\frac{100 \times I}{P \times T}$ %= $\frac{100 \times 264.60}{5,292 \times 1}$ %= 5%

(ii) Let the sum of money= Rs100

∴ Interest on it for 1st year= 5% of Rs100= Rs5

⇒Amount in one year= Rs100+ Rs5= Rs105

Similarly, amount in two years= Rs105+ 5% of Rs105

= Rs105+ Rs5.25

= Rs110.25

When amount in two years is Rs110.25, sum = Rs100

⇒When amount in two years is Rs5,292, sum = Rs $\frac{100 \times 5,292}{110.25}$

= Rs4,800

Solution 4:

(i)C.I. for second year = Rs1,089
C.I. for third year = Rs 1,197.90
∵ Difference between the C.I. of two successive years
= Rs1,197.90 - Rs1089= Rs108.90
⇒Rs108.90 is the interest of one year on Rs1089

$\therefore$ Rate of interest= Rs $\frac{100 \times I}{P \times T}$ %= $\frac{100 \times 108.90}{1089 \times 1}$ %= 10%

(ii) Let the sum of money= Rs100
$\therefore$ Interest on it for 1st year= 10% of Rs100= Rs10
⇒Amount in one year= Rs100+ Rs10= Rs110
Similarly, C.I. for 2nd year= 10% of Rs110
= Rs11
When C.I. for 2nd year is Rs11, sum = Rs100
⇒When C.I. for 2nd year is Rs1089, sum = Rs $\frac{100 \times 1089}{11}$ = Rs9,900

Solution 5:

For 1st year
P=Rs8,000; A=9,440 and T= 1year
Interest= Rs9,440 - Rs8,000= Rs1,440

Rate= $\frac{I \times 100}{P \times T}$ %= $\frac{1,440 \times 100}{8,000 \times 1}$ %=18%

For 2nd year
P= Rs9,440; R=18% and T= 1year

Interest= Rs $\frac{9,440 \times 18 \times 1}{100}$ = Rs1,699.20

Amount= Rs9,440 + Rs1,699.20= Rs11,139.20
For 3rd year
P= Rs11,139.20; R=18% and T= 1year

Interest= Rs $\frac{11,139.20 \times 18 \times 1}{100}$ = Rs2,005.06

Solution 6:

For 1st half-year
P= Rs15,000; A= Rs15,600 and T= ½ year
Interest= Rs15,600 - Rs15,000= Rs600

Rate= $\frac{I \times 100}{P \times T}$ %= $\frac{600 \times 100}{15,000 \times \frac{1}{2}}$ %= 8% Ans.

For 2nd half-year
P= Rs15,600; R=8% and T= ½ year

Interest= Rs $\frac{15,600 \times 8 \times \frac{1}{2}}{100}$ = Rs624

Amount= Rs15,600 + Rs624= Rs16,224
For 3rd half-year
P= Rs16,224; R=8% and T= ½ year

Interest= Rs $\frac{16,224 \times 8 \times \frac{1}{2}}{100}$ = Rs648.96

Amount= Rs16,224+ Rs648.96= Rs16,872.96 Ans.

Solution 7:

For 1st year

P=Rs12,800; R=10% and T= 1year

Interest= Rs $\frac{12,800 \times 10 \times 1}{100}$ = Rs1,280

Amount= Rs12,800+ Rs1,280= Rs14,080

For 2nd year

P=Rs14,080; R=10% and T= 1 year

Interest= Rs $\frac{14,080 \times 10 \times 1}{100}$ = Rs1,408

Amount= Rs14,080+ Rs1,408= Rs15,488

For 3rd year

P=Rs15,488; R=10% and T= 1year

Interest= Rs $\frac{15,488 \times 10 \times 1}{100}$ = Rs1,548.80

Amount= Rs15,488+ Rs1,548.80= Rs17,036.80

Solution 8:

(i)C.I. for second year = Rs864

C.I. for third year = Rs933.12

∵ Difference between the C.I. of two successive years

= Rs933.12 - Rs864= Rs69.12

⇒Rs69.12 is the interest of one year on Rs864

∴ Rate of interest= Rs $\frac{100 \times I}{P \times T}$ %= $\frac{100 \times 69.12}{864 \times 1}$ %= 8% Ans.

(ii) Let the sum of money= Rs100

∴ Interest on it for 1st year= 8% of Rs100= Rs8

⇒Amount in one year= Rs100+ Rs8= Rs108

Similarly, C.I. for 2nd year= 8% of Rs108

= Rs8.64

When C.I. for 2nd year is Rs8.64, sum = Rs100

⇒When C.I. for 2nd year is Rs864, sum = Rs $\frac{100 \times 864}{8.64}$ = Rs10,000

Interest for 1st year= Rs $\frac{10,000 \times 8 \times 1}{100}$ = Rs800

Principal for 4th year= Rs10,000+Rs800+Rs864+Rs933.12

= Rs12,597.12

∴ Interest for 4th year= 8% of Rs12,597.12

= Rs1,007.77 Ans.

Solution 9:

(i)Amount in three years= Rs20,160
Amount in four years= Rs24,192
∵ Difference between the amounts of two successive years
= Rs24,192 - Rs20,160= Rs4,032
⇒Rs4,032 is the interest of one year on Rs20,160

$\therefore$ Rate of interest= Rs $\frac{100 \times I}{P \times T}$ %= $\frac{100 \times 4032}{20,160 \times 1}$ %= 20%

(ii) Let amount in two years= Rs100
And amount in three years = Rs100+ 20% of Rs100
= Rs100+ Rs20
= Rs120
When amount in 3 years is Rs120, amount in two years= Rs100

⇒When amount in 3 years is Rs20,160, sum = Rs $\frac{100 \times 20,160}{120}$ = Rs16,800 Ans.

(iii)Amount in 5years= Rs24,192+ 20% of Rs24,192
= Rs24,192 +Rs4,838.40
= Rs29,030.40

Solution 10:

(i) For 1st year
P= Rs8,000; R=7% and T=1year

Interest= Rs $\frac{8,000 \times 7 \times 1}{100}$ = Rs560

Amount= Rs8,000+ Rs560= Rs8,560
Money returned= Rs3,560
Balance money for 2nd year= Rs8,560- Rs3,560= Rs5,000
For 2nd year
P= Rs5,000; R=7% and T=1year

Interest paid for the second year= Rs $\frac{5,000 \times 7 \times 1}{100}$ = Rs350 Ans.

(ii)The total interest paid in two years= Rs350 + Rs560
= Rs910 Ans.
(iii) The total amount of money paid in two years to clear the debt
= Rs8,000+ Rs910
= Rs8,910 Ans.

Solution 11:

(i)

Difference between depreciation in value between the first and second years
₹4,000 - ₹3,600 = ₹400
⇒ Depreciation of one year on ₹4,000 = ₹400

$$\Rightarrow \text{Rate of depreciation} = \frac{400}{4000} \times 100\% = 10\%$$

(ii)

Let ₹100 be the original cost of the machine.

Depreciation during the 1st year = 10% of ₹100 = ₹10

When the values depreciates by ₹10 during the 1st year, Original cost = ₹100

⇒When the depreciation during 1st year = ₹4,000,

$$\text{Original cost} = \frac{100}{10} \times 4000 = 40000$$

The original cost of the machine is ₹40,000.

(iii)

Total depreciation during all the three years
= Depreciation in value during(1st year + 2nd year + 3rd year)
= ₹4,000 + ₹3,600 + 10% of (₹40,000 - ₹7,600)
= ₹4,000 + ₹3,600 + ₹3,240
= ₹10,840

The cost of the machine at the end of the third year
= ₹40,000 - ₹10,840 = ₹29,160

Solution 12:

Cost of machine= Rs32,000
Depreciation rate every year= 5%
∴ Cost of machine after one year=Rs32,000- 5% of Rs32,000
=Rs32,000- Rs1,600
=Rs30,400
∴ Cost of machine after two year=Rs30,400- 5% of Rs30,400
=Rs30,400- Rs1,520
=Rs28,880
∴ Total depreciation in two years=Rs32,000 - Rs28,880
=Rs3,120 Ans.

Solution 13:

Let the sum of money be Rs 100
Rate of interest= 10%p.a.
Interest at the end of 1st year= 10% of Rs100= Rs10
Amount at the end of 1st year= Rs100 + Rs10= Rs110
Interest at the end of 2nd year=10% of Rs110 = Rs11
Amount at the end of 2nd year= Rs110 + Rs11= Rs121
Interest at the end of 3rd year=10% of Rs121= Rs12.10
∴ Difference between interest of 3rd year and 1st year
=Rs12.10- Rs10=Rs2.10
When difference is Rs2.10, principal is Rs100

When difference is Rs252, principal = $\frac{100 \times 252}{2.10}$ =Rs12,000 Ans.

Solution 14:

For 1st year
P= Rs10,000; R=10% and T= 1year

Interest= Rs $\frac{10,000 \times 10 \times 1}{100}$ =Rs1,000

Amount at the end of 1st year=Rs10,000+Rs1,000=Rs11,000
Money paid at the end of 1st year=30% of Rs10,000=Rs3,000
∴ Principal for 2nd year=Rs11,000- Rs3,000=Rs8,000
For 2nd year
P=Rs8,000; R=10% and T= 1year

Interest= Rs $\frac{8,000 \times 10 \times 1}{100}$ = Rs800

Amount at the end of 2nd year=Rs8,000+Rs800= Rs8,800
Money paid at the end of 2nd year=30% of Rs10,000= Rs3,000
∴ Principal for 3rd year=Rs8,800- Rs3,000=Rs5,800 Ans.

Solution 15:

For 1st year
P= Rs10,000; R=10% and T= 1year

Interest= Rs $\frac{10,000 \times 10 \times 1}{100}$ =Rs1,000

Amount at the end of 1st year=Rs10,000+Rs1,000=Rs11,000
Money paid at the end of 1st year=20% of Rs11,000=Rs2,200
∴ Principal for 2nd year=Rs11,000- Rs2,200=Rs8,800
For 2nd year
P=Rs8,800; R=10% and T= 1year

Interest= Rs $\frac{8,800 \times 10 \times 1}{100}$ = Rs880

Amount at the end of 2nd year=Rs8,800+Rs880= Rs9,680
Money paid at the end of 2nd year=20% of Rs9,680= Rs1,936
∴ Principal for 3rd year=Rs9,680- Rs1,936=Rs7,744 Ans.

Exercise 2(D)

Solution 1:

Let principal (p) = Rs. 100

For 1st year

P = Rs. 100

R = 10%

T = 1 year

$$I = \frac{100 \times 100 \times 1}{100} = Rs.10$$

A = 100 + 10 = Rs. 110

For 2nd year

P = Rs. 110

R = 11%

T = 1 year

$$I = \frac{110 \times 11 \times 1}{100} = Rs.12.10$$

A = 110 + 12.10 = Rs. 122.10

If Amount is Rs. 122.10 on a sum of Rs. = 100

If amount is Rs. 1, sum = $\frac{100}{122.10}$

If amount is Rs. 6593.40, sum = $\frac{100}{122.10} \times 6593.40$

= Rs. 5400

Solution 2:

Let the value of machine in the beginning = Rs. 100

For 1st year depreciation = 10% of Rs. 100 = Rs. 100

Value of machine for second year = 100 - 10

= Rs. 90

For 2nd year depreciation = 10% of 90 = Rs. 9

Value of machine for third year = 90 - 9

= Rs. 81

For 3rd year depreciation = 15% of 81

= Rs. 12.15

Value of machine at the end of third year = 81 - 12.15

= Rs. 68.85

Net depreciation = Rs. 100 - Rs. 68.85

= Rs. 31.15

Or 31.15%

Solution 3:

For 1st half-year

P=Rs12,000; R=10% and T=1/2 year

Interest= Rs $\frac{12,000 \times 10 \times 1}{100 \times 2}$ = Rs600

Amount= RS12,000 + Rs600= Rs12,600

Money paid at the end of 1st half year=Rs4,000

Balance money for 2nd half-year= Rs12,600- Rs4,000=Rs8,600

For 2nd half-year

P=Rs8,600; R=10% and T=1/2 year

Interest=Rs $\frac{8,600 \times 10 \times 1}{100 \times 2}$ =Rs430

Amount= Rs8,600+ Rs430= Rs9,030

Money paid at the end of 2nd half-year=Rs4,000

Balance money for 3rd half-year= Rs9,030- Rs4,000=Rs5,030

For 3rd half-year

P=Rs5,030; R=10% and T=1/2 year

Interest = Rs $\frac{5,030 \times 10 \times 1}{100 \times 2}$ = Rs251.50

Amount= Rs5,030 + Rs251.50= Rs5,281.50

Solution 4:

Let Principal= Rs 100

For 1st year

P=Rs100; R=10% and T=1year

Interest= Rs $\frac{100 \times 10 \times 1}{100}$ = Rs10

Amount= Rs100 + Rs10= Rs110

For 2nd year

P=Rs110; R=10% and T= 1year

Interest= Rs $\frac{110 \times 10 \times 1}{100}$ = Rs11

Amount= Rs110 + Rs11= Rs121

For 3rd year

P=Rs121; R=10% and T= 1year

Interest= Rs $\frac{121 \times 10 \times 1}{100}$ = Rs12.10

Sum of C.I. for 1st year and 3rd year=Rs10+Rs12.10=Rs22.10

When sum is Rs22.10, principal is Rs100

When sum is Rs2,652, principal =Rs $\frac{100 \times 2652}{22.10}$ =Rs12,000 Ans.

Solution 5:

Let original value of machine=Rs100

For 1st year

P=Rs100; R=12% and T= 1year

Depreciation in 1st year= Rs $\frac{100 \times 12 \times 1}{100}$ =Rs12

Value at the end of 1st year=Rs100 - Rs12=Rs88

For 2nd year

P= Rs88; R=12% and T= 1year

Depreciation in 2nd year= Rs $\frac{88 \times 12 \times 1}{100}$ =Rs10.56

When depreciation in 2nd year is Rs10.56, original cost is Rs100

When depreciation in 2nd year is Rs2,640, original cost= $\frac{100 \times 2640}{10.56}$

=Rs25,000

Solution 6:

Let ₹x be the sum.

Simple Interest(I) = $\frac{x \times 8 \times 1}{100} = 0.08x$

Compound interest

For 1st year:

P = ₹x, R = 8% and T=1

$\Rightarrow$ Interest(I) = $\frac{x \times 8 \times 1}{100} = 0.08x$

For 2nd year:

P = ₹x+₹0.08x = ₹1.08x

$\Rightarrow$ Interest(I) = $\frac{1.08x \times 8 \times 1}{100} = 0.0864x$

The difference between the simple interest and compound interest at the rate of 8% per annum compounded annually should be ₹64 in 2 years.

$\Rightarrow$₹0.08x - ₹0.0864x = ₹64

$\Rightarrow$₹0.0064x = ₹64

$\Rightarrow$x = ₹10000

Hence the sum is ₹10000.

Solution 7:

For 1st year

P=Rs13,500; R=16% and T= 1year

Interest= Rs $\frac{13,500 \times 16 \times 1}{100}$ = Rs2,160

Amount= Rs13,500 + Rs2,160= Rs15,660

For 2nd year

P=Rs15,660; R=16% and T= 1year

Interest= Rs $\frac{15,660 \times 16 \times 1}{100}$ = Rs2,505.60

=Rs2,506

Solution 8:

For 1st year
P=Rs48,000; R=10% and T= 1year

$$\text{Interest= Rs}\frac{48,000 \times 10 \times 1}{100} = \text{Rs4,800}$$

Amount= Rs48,000+ Rs4,800= Rs52,800
For 2nd year
P=Rs52,800; R=10% and T= 1year

$$\text{Interest= Rs}\frac{52,800 \times 10 \times 1}{100} = \text{Rs5,280}$$

Amount= Rs52,800+ Rs5,280= Rs58,080
For 3rd year
P=Rs58,080; R=10% and T= 1year

$$\text{Interest= Rs}\frac{58,080 \times 10 \times 1}{100} = \text{Rs5,808}$$

Solution 9:

Let $x\%$ be the rate of interest charged.

For 1st year:
P = ₹12,000, R = x% and T = 1

$$\Rightarrow \text{Interest(I)} = \frac{12000 \times x \times 1}{100} = 120x$$

For 2nd year:
After a year, Ashok paid back ₹4,000.
P = ₹12,000 + ₹120x - ₹4,000 = ₹8,000 + ₹120x

$$\Rightarrow \text{Interest(I)} = \frac{(8000 + 120x) \times 1}{100} = \left(80x + 1.20x^2\right)$$

The compound interest for the second year is ₹920
$₹ (80x + 1.20x^2) = ₹920$
$\Rightarrow 1.20x^2 + 80x - 920 = 0$
$\Rightarrow 3x^2 + 200x - 2300 = 0$
$\Rightarrow 3x^2 + 230x - 30x - 2300 = 0$
$\Rightarrow x(3x + 230) - 10(3x + 230) = 0$
$\Rightarrow (3x + 230)(x - 10) = 0$
$\Rightarrow x = -230/3$ or $x = 10$

As rate of interest cannot be negative so x = 10.
Therefore the rate of interest charged is 10%.

(ii)

For 1st year:
Interest = ₹120x = ₹1200

For 2nd year:
Interest = $₹(80x + 1.20x^2)$ = ₹920

The amount of debt at the end of the second year is equal to the addition of principal of the second year and interest for the two years.
Debt = Rs.8,000 + Rs.1200 + Rs.920 = Rs.10,120

Solution 10:

Total interest obtained in the first year = Rs. 1500

Interest for the second year – Total interest obtained in the first year

= Rs. 1,725 – Rs. 1,500

= Rs. 225

Rate of interest for the second year

$$= \frac{\text{Rs. } 225}{\text{Rs. } 1,500} \times 100 = 15\%$$

Interest for the third year – Interest for the second year

= Rs. 2,070 – Rs. 1,725

= Rs. 345

Rate of interest for the third year

$$= \frac{\text{Rs. } 345}{\text{Rs. } 1,725} \times 100 = 20\%$$

So, rate of interest for the second year and third year are 15% and 20% respectively.