Solution 3:
Exercise 3(C)

Solution 1:

Given: P=Rs7,400; r=5% p.a. and n= 1year
Since the interest is compounded half-yearly,

Then $A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2}$

$=7,400\left(1+\frac{5}{2\times 100}\right)^{1\times 2}$

$=7,400\left(\frac{41}{40}\right)^{2}$

$=Rs7,774.63$

(i)When interest is compounded yearly

Given: P=Rs10,000; n=18months= $1\frac{1}{2}$ year and r=10%p.a.

For 1year

$A=P\left(1+\frac{r}{100}\right)^{n}=10,000\left(1+\frac{10}{100}\right)^{1}=10,000\left(\frac{11}{10}\right)^{1}=Rs11,000$

For 1/2 year
P=Rs11,000;n= 1/2 year and r=10%

$A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2}=11,000\left(1+\frac{10}{2\times 100}\right)^{\frac{1}{2}\times 2}=11,000\left(\frac{21}{20}\right)^{1}$

$=Rs11,550$

∴ C.I.= Rs11,550 - Rs10,000= Rs1,550

(ii)When interest is compounded half-yearly

P=Rs10,000; n= $1\frac{1}{2}$ year and r=10%p.a.

$A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2}=10,000\left(1+\frac{10}{2\times 100}\right)^{\frac{3}{2}\times 2}$

$=10,000\left(\frac{21}{20}\right)^{3}$

$=Rs11,576.25$

∴ C.I.= Rs11,576.25 - Rs10,000=Rs1,576.25

∴ Difference between both C.I.= Rs1,576.25 - Rs1,550
= Rs26.25 Ans.

Solution 4:

For the first 2 years

$$S.I. = \frac{P \times N \times R}{100}$$

$$\Rightarrow S.I. = \frac{16,000 \times 2 \times 20}{100}$$

$$\Rightarrow S.I. = 6,400$$

$$Amount = S.I. + P$$

$$\Rightarrow Amount = 6,400 + 16,000$$

$$\Rightarrow Amount = 22,400$$

Amount in the account at the end of the two years is ₹22,400.

For the remaining one year

$$A = P\left(1 + \frac{r}{2 \times 100}\right)^{n \times 2}$$

$$\Rightarrow A = 22,400\left(1 + \frac{20}{200}\right)^{2}$$

$$\Rightarrow A = 22,400\left(\frac{11}{10}\right)^{2}$$

$$\Rightarrow A = 27,104$$

The total amount to be paid at the end of the three years is ₹27,104.

Solution 5:

$$A = P\left(1+\frac{r}{2\times 100}\right)^{n\times 2}$$

$$\Rightarrow 27,783 = P\left(1+\frac{10}{200}\right)^{\frac{3}{2}\times 2}$$

$$\Rightarrow 27,783 = P\left(\frac{21}{20}\right)^{3}$$

$$\Rightarrow P = 27,783\left(\frac{20}{21}\right)^{3}$$

$$\Rightarrow P = 24,000$$

The sum of ₹24,000 amount ₹27,783 in one and a half years at 10% per annum compounded half yearly.

Solution 5:

(i)For Ashok(interest is compounded yearly)

Let P=Rs y; n=18months= $1\frac{1}{2}$ year and r=20%p.a.

For 1year

$$A=P\left(1+\frac{r}{100}\right)^{n} = y\left(1+\frac{20}{100}\right)^{1} = \left(\frac{6}{5}\right)y$$

For 1/2 year

P= Rs $\left(\frac{6}{5}\right)y$;n= ½ year and r=20%

$$A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2} = Rs\left(\frac{6}{5}\right)y\left(1+\frac{20}{2\times 100}\right)^{\frac{1}{2}\times 2} = Rs\left(\frac{66}{50}\right)y$$

(ii)For Geeta(interest is compounded half-yearly)

P=Rs y; n= $1\frac{1}{2}$ year and r=20%p.a.

$$A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2} = y\left(1+\frac{20}{2\times 100}\right)^{\frac{3}{2}\times 2} = y\left(\frac{11}{10}\right)^{3}$$

$$= Rs\left(\frac{1,331}{1,000}\right)y$$

According to question

$$\therefore \left(\frac{1,331}{1,000}\right)y - \left(\frac{66}{50}\right)y = Rs33$$

$$\Rightarrow \left(\frac{11}{1,000}\right)y = Rs33$$

$$\Rightarrow y = Rs\frac{33\times 1,000}{11} = Rs3,000$$

∴ Money invested by each person=Rs3,000 Ans.

Solution 6:

$$C.I = P\left[\left(1+\frac{r}{2\times 100}\right)^{2n}-1\right]$$

$$\Rightarrow 5,100 = 62,500\left[\left(1+\frac{r}{200}\right)^{2}-1\right]$$

$$\Rightarrow \left(1+\frac{r}{200}\right)^{2} = \frac{67,600}{62,500}$$

$$\Rightarrow 1+\frac{r}{200} = \frac{260}{250}$$

$$\Rightarrow r = 8$$

The rate of interest is 8%.

Solution 7:

Given: P=Rs1,500; C.I.=Rs496.50 and r=20%
Since interest is compounded semi-annually

Then $C.I. = P\left[\left(1+\frac{r}{2\times 100}\right)^{n\times 2}-1\right]$

$$\Rightarrow 496.50 = 1,500\left[\left(1+\frac{20}{2\times 100}\right)^{n\times 2}-1\right]$$

$$\Rightarrow \frac{496.50}{1,500} = \left(\frac{11}{10}\right)^{2n}-1$$

$$\Rightarrow \frac{331}{1,000}+1 = \left(\frac{11}{10}\right)^{2n}$$

$$\Rightarrow \frac{1,331}{1,000} = \left(\frac{11}{10}\right)^{2n}$$

$$\Rightarrow \left(\frac{11}{10}\right)^{3} = \left(\frac{11}{10}\right)^{2n}$$

On comparing, we get

$2n=3 \Rightarrow n=1\frac{1}{2}$ years Ans.

Solution 8:

Given: P=Rs 3,500; r=6% and n= 3years
Since interest is being compounded half-yearly

Then $C.I. = P\left[\left(1+\frac{r}{2\times 100}\right)^{n\times 2} - 1\right]$

$= 3,500\left[\left(1+\frac{6}{2\times 100}\right)^{3\times 2} - 1\right]$

$= 3,500\left[\left(\frac{103}{100}\right)^{6} - 1\right]$

$= 3,500\left[(1.03)^{6} - 1\right]$

$= 3,500[1.194052 - 1]$

$= 3,500 \times 0.194052$

$= Rs679.18$

Ans.

Solution 9:

Given: P=Rs12,000; n= $1\frac{1}{2}$ years and r= 10% $S.I. = \frac{P\times R\times T}{100} = \frac{12,000\times 10\times \frac{3}{2}}{100} = Rs1,800$

To calculate C.I.
For 1year
P=Rs12,000; n=1year and r=10%

$A = P\left(1+\frac{r}{100}\right)^{n} = 12,000\left(1+\frac{10}{100}\right)^{1} = Rs13,200$

For next 1/2 year
P=Rs13,200;n= 1/2 year and r=10%

$A = P\left(1+\frac{r}{2\times 100}\right)^{n\times 2} = 13,200\left(1+\frac{10}{2\times 100}\right)^{\frac{1}{2}\times 2}$

$= 13,200\left(\frac{21}{20}\right)^{1}$

$= Rs13,860$

∴ C.I.=Rs13,860 - Rs12,000= Rs1,860
∴ Difference between C.I. and S.I
=Rs1,860 - Rs1,800=Rs60 Ans.

Solution 10:

Given: P=Rs12,000; n= $1\frac{1}{2}$ years and r= 10% $S.I.=\frac{P\times R\times T}{100}=\frac{12,000\times 10\times \frac{3}{2}}{100}=Rs1,800$

To calculate C.I.(compounded half-yearly)

P=Rs12,000;n= $1\frac{1}{2}$ years and r=10%

$$A=P\left(1+\frac{r}{2\times 100}\right)^{n\times 2}=12,000\left(1+\frac{10}{2\times 100}\right)^{\frac{3}{2}\times 2}$$

$$=12,000\left(\frac{21}{20}\right)^{3}$$

$$=Rs13,891.50$$

∴ C.I.= Rs13,891.50 - Rs12,000= Rs1,891.50

∴ Difference between C.I. and S.I

=Rs1,891.50 - Rs1,800=Rs91.50 Ans.