STAFF SELECTION COMMISSION – Solved Papers

COMPOUND INTEREST (Some Important Exercises)

1. Find compound interest on Rs. 5000 for 2 years at 10% per annum, compounded half-yearly.

(1) Rs. 1077.5

(2) Rs. 1072.5

(3) Rs. 1000

(4) Rs. 1100

Ans : 1

$$A = P\left(1+\frac{r}{200}\right)^{2t}$$

Here, P = Rs. 5000

r = 10% per annum

t = 2 years

So, $A = 5000\left(1+\frac{10}{200}\right)^{4}$

$= 5000\left(1+\frac{5}{100}\right)^{4}$

$= 5000\times\frac{194481}{160000} = \frac{194481}{32}$

A = Rs. 6077.5

CI = Rs. (6077.5 – 5000)

CI = Rs. 1077.5

2. Find compound interest on Rs. 3000 for 2 months at 4% per month.

(1) Rs. 240.80

(2) Rs. 244.80

(3) Rs. 235

(4) Rs. 235.50

Ans : 2

Since rate percent and time period are given in the same unit of time i.e., we can write

$$A = P\left(1+\frac{r}{200}\right)^{t}$$

Here, P = Rs. 3000

r = 4% per month

t = 2 months.

$A = 3000\left(1+\frac{4}{100}\right)^{2}$

$= 3000\times\frac{676}{625}$

A = Rs. 3244.8

CI = Rs. 244.8

3. Ram invests Rs. 5000 in a bond which gives interest at 4% per annum during the first year, 5% during the second year and 10% during the third year. How much does he get at the end of third year?

(1) Rs. 7000   (2) Rs. 5006

(3) Rs. 6006   (4) Rs. 5506

Ans : 3

$$A = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$$

Here, P = Rs. 5000

$r_1 = 4\%$

$r_2 = 5\%$

$r_3 = 10\%$

$A = 5000\left(1+\frac{4}{100}\right)\left(1+\frac{5}{100}\right)\left(1+\frac{10}{100}\right)$

$= 5000\times\frac{26}{25}\times\frac{21}{20}\times\frac{11}{10}$

A = Rs. 6006.

4. Find compound interest on Rs. 10,000 for $3\frac{1}{2}$ years at 10% per annum, compounded yearly.

(1) Rs. 3675.50

(2) Rs. 3775.50

(3) Rs. 3875.50

(4) Rs. 3975.50

Ans : 4

$$A = P\left(1+\frac{r}{100}\right)^{3}\left(1+\frac{\frac{r}{2}}{100}\right)$$

$= 10,000\left(1+\frac{10}{100}\right)^{3}\left(1+\frac{5}{100}\right)$

$= 10,000\times\frac{1331}{1000}\times\frac{21}{20}$

A = Rs. 13975.5

CI = Rs. (13975.5 – 10,000)

CI = Rs. 3975.5

5. Find the present worth of Rs. 9261 due 3 years hence at 5% per annum compounded yearly.

(1) Rs. 8000   (2) Rs. 8200

(3) Rs. 8500   (4) Rs. 8700

Ans : 1

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

Here, A = Rs. 9261

r = 5% per annum

t = 3 years

$$P = \frac{9261}{\left(1+\frac{5}{100}\right)^3} = \frac{9261}{\frac{9261}{8000}}$$

P = Rs. 8000

6. Find the ratio of simple interest to compound interest for 2 years at 4% per annum, compounded yearly in case of compound interest.

(1) 50 : 53   (2) 50 : 51

(3) 49 : 50   (4) 48 : 53

Ans : 2

$$\frac{SI}{CI} = \frac{rt}{100\left[\left(1+\frac{r}{100}\right)^t - 1\right]}$$

$$= \frac{4\times2}{100\left[\left(1+\frac{4}{100}\right)^2 - 1\right]}$$

$$= \frac{2}{25\left(\frac{676}{625} - 1\right)}$$

$$= \frac{2\times625}{25\times51}$$

$$\frac{SI}{CI} = \frac{50}{51}$$

7. In What time will Rs. 15625 amount to 17576 at 4% per annum, compounded yearly?

(1) 4 years   (2) 2.5 years

(3) 3 years   (4) 3.5 years

Ans : 3

A = Rs. 17576

P = Rs. 15625

r = 4% per annum

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

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

$$\left(1+\frac{4}{100}\right)^t = \frac{17576}{15625}$$

$$\left(\frac{26}{25}\right)^t = \frac{17576}{15625} = \left(\frac{26}{25}\right)^3$$

∴ t = 3 years

8. If SI on a certain sum of money at 4% per annum for 2 years be Rs. 125, what would be the interest if it were compounded annually at the same rate and for the same time period?

(1) Rs. 127.50   (2) Rs. 125.50

(3) Rs. 135.50   (4) Rs. 138

Ans : 1

$$\frac{CI}{SI} = \frac{100\left[\left(1+\frac{r}{100}\right)^t - 1\right]}{rt}$$

$$= \frac{100\left[\left(1+\frac{4}{100}\right)^2 - 1\right]}{4\times2}$$

$$= \frac{100\times\left(\frac{676}{625} - 1\right)}{4\times2}$$

$$\frac{CI}{125} = \frac{100\times51}{4\times2\times625}$$

CI = Rs. 127.5

9. The compound interest on a sum of money at 5% per annum for 3 years is Rs. 2522. What would be the simple interest on this sum at the same rate and for the same period?

(1) Rs. 2500   (2) Rs. 2400

(3) Rs. 2450   (4) Rs. 2350

Ans : 2

$$SI = CI\times\frac{rt}{100\left[\left(1+\frac{r}{100}\right)^t - 1\right]}$$

$$= \frac{2522\times5\times3}{100\left[\left(1+\frac{5}{100}\right)^3 - 1\right]}$$

$$SI = \frac{2522\times5\times3}{100\left[\frac{9261}{8000} - 1\right]}$$

$$= \frac{2522\times5\times3}{100\times1261}\times8000$$

SI = Rs. 2400.

10. The simple interst on a certain sum for 2 years is Rs. 50 and the compound interest is Rs. 55. Find the rate of interest per annum and the sum.

(1) 16% P.a. : Rs. 200

(2) 15% P.a. : Rs. 150

(3) 20% P.a. : Rs. 125

(4) 18% P.a. : Rs. 175

Ans : 3

The difference between CI and SI for 2 years period is because CI also includes interest for the second year on the first year's interest.

CI – SI = Rs. (55 – 50) = Rs. 5

First year's SI =

$$\frac{Rs.50}{2} = Rs.25$$

So, Rs. 5 is the interest on Rs. 25 for 1 year.

$$r = \frac{100I}{pt}$$

Here, I = Rs. 5

P = Rs. 25

t = 1 year

$$r = \frac{100 \times 5}{25 \times 1}$$

r = 20% per annum.

Now, to find the principal sum we use the SI given for 2 years.

$$P = \frac{100I}{rt}$$

Here, I = Rs. 50

r = 20% per annum

t = 2 years.

$$P = \frac{100 \times 50}{20 \times 2}$$

P = Rs. 125.

Note : Direct Formula for 2 years problems :

$$Rate = \frac{2 \times (CI - SI)}{SI} \times 100$$

$$Sum = \frac{SI \times 100}{Rate \times 2}$$

11. If the difference between CI and SI on a certain sum at $r\%$ per annum for 2 years is Rs. x, find the expression for principal sum. If the difference between CI and SI on a certain sum at 4% per annum for 2 years is Rs. 25, find the sum.

(1) Rs. 18625   (2) Rs. 16625

(3) Rs. 14625   (4) Rs. 15625

Ans : 4

Let the sum be Rs. P

$$SI = \frac{Pr \times 2}{100} = \frac{2Pr}{100}$$

$$CI = P\left[\left(1 + \frac{r}{100}\right)^2 - 1\right]$$

$$= P\left[1 + \frac{r^2}{100^2} + \frac{2r}{100} - 1\right]$$

$$CI = P\left[\frac{r^2}{100^2} + \frac{2r}{100}\right]$$

[using $(a + b)^2 = a^2 + b^2 + 2ab$]

CI – SI

$$= P\left[\frac{r^2}{100^2} + \frac{2r}{100}\right] - \frac{2Pr}{100}$$

Where, CI – SI = x (assumed)

$$x = \frac{Pr^2}{100^2}$$

$$P = x\left(\frac{100}{r}\right)^2$$

Here, x = Rs. 25

r = 4% per annum

$$P = 25\left(\frac{100}{4}\right)^2$$

$$P = 25 \times 625$$

$$P = Rs. 15625$$

12. If the difference between CI and SI on a certain sum at $r\%$ per annum for 3 years is Rs. x, find the expression for the principal sum. If the difference between CI and SI on a certain sum at 4% for 3 years is Rs. 608. Find the sum.

(1) Rs. 125000

(2) Rs. 120000

(3) Rs. 130000

(4) Rs. 122250

Ans : 1

Let the sum be Rs. P

$$SI = \frac{Pr \times 3}{100} = \frac{3Pr}{100}$$

$$CI = P\left[\left(1 + \frac{r}{100}\right)^3 - 1\right]$$

$$CI = P\left[1 + \frac{r^3}{100^3} + \frac{3r^2}{100^2} + \frac{3r}{100} - 1\right]$$

$$CI = P\left[\frac{r^3}{100^3} + \frac{3r^2}{100^2} + \frac{3r}{100}\right]$$

CI – SI

$$= P\left[\frac{r^3}{100^3} + \frac{3r^2}{100^2} + \frac{3r}{100}\right] - \frac{3Pr}{100}$$

$$x = P\left[\frac{r^3}{100^3} + \frac{3r^2}{100^2}\right]$$

$$x = P\left(\frac{r^2}{100^3}\right)[r + 300]$$

$$P = \frac{x(100)^3}{r^2(r + 300)}$$

Here, x = Rs. 608

r = 4% per annum

$$P = \frac{608 \times 100 \times 100 \times 100}{4 \times 4 \times (4 + 300)}$$

P = Rs. 1,25,000.

13. A sum amounts to Rs. 9680 in 2 years and to Rs. 10648 in 3 years compounded annually. Find the principal and the rate of interest per annum.

(1) 12% ; Rs. 7500

(2) 10% ; Rs. 8000

(3) 11% ; Rs. 11000

(4) None of these

Ans : 2

P = x

r = $r\%$ p.a.

A_1 = Rs. 9680

t_1 = 2 years

A_2 = Rs. 10648

t_2 = 3 years

Interest on Rs. 9680 for 1 year

= 10648 – 9680 = Rs. 968

$\therefore r = \dfrac{968 \times 100}{9680} = 10$

Using $A = P\left(1 + \dfrac{r}{100}\right)^t$ we get

$9680 = x\left(1 + \dfrac{10}{100}\right)^2 = x\left(\dfrac{11}{10}\right)^2$

$\Rightarrow x = 9680 \times \dfrac{10}{11} \times \dfrac{10}{11} = 8000$

$\Rightarrow$ Principal = Rs. 8000.

14. Divide Rs. 10230 into two parts such that the first part after 10 years is equal to the second part after 7 years, compound interest being 20% per annum compounded yearly.

(1) Rs. 4150; Rs. 6080

(2) Rs. 3950; Rs. 6280

(3) Rs. 3750; Rs. 6480

(4) Rs. 3550; Rs. 6680

Ans : 3

Let the first part be Rs. x and the second part Rs. y.

The first part after 10 years

$= x\left[1 + \dfrac{20}{100}\right]^{10}$

The second part after 7 years

$= y\left[1 + \dfrac{20}{100}\right]^{7}$

As given in the problem these two amounts are equal.

So,

$y\left(1 + \dfrac{20}{100}\right)^{7} = x\left(1 + \dfrac{20}{100}\right)^{10}$

or, $\dfrac{y}{x} = \left(1 + \dfrac{20}{100}\right)^{3}$

or, $\dfrac{y}{x} = \dfrac{216}{125}$

and we have y + x = Rs. 10230

Using the ratio formula

$y = \dfrac{216}{216 + 125} \times 10230 = Rs.\,6480$

$x = \dfrac{125}{216 + 125} \times 10230 = Rs.\,3750$

15. A sum of Rs. 1682 is to be divided between A and B who are respectively 20 years and 22 years old. They invest their shares at 5% per annum, compounded annually. At the age of 25 years both receive equal amounts. Find the share of each.

(1) Rs. 730 ; Rs. 952

(2) Rs. 750 ; Rs. 932

(3) Rs. 700 ; Rs. 982

(4) Rs. 800 ; Rs. 882

Ans : 4

For A, time = 5 years

For B, time = 3 years

r = 5% per annum

$A\left(1 + \dfrac{5}{100}\right)^{5} = B\left(1 + \dfrac{5}{100}\right)^{3}$

$\dfrac{B}{A} = \left(1 + \dfrac{5}{100}\right)^{2}$

$\dfrac{B}{A} = \dfrac{441}{400}$

As given A + B = Rs. 1682

So,

$A = \dfrac{400}{400 + 441} \times 1682 = Rs.\,800$

and

$B = \dfrac{441}{400 + 441} \times 1682 = Rs.\,882$

16. A sum of money was lent at 10% per annum, compounded annually, for 2 years. If the interest was compounded half-yearly, he would have received Rs. 220.25 more. Find the sum.

(1) Rs. 40000   (2) Rs. 45000

(3) Rs. 48000   (4) Rs. 50000

Ans : 1

Let the sum be Rs. P.

When compounded yearly, amount

$= P\left[1 + \dfrac{10}{100}\right]^{2} = \dfrac{121}{100}P$

When compounded half-yearly, amount

$= P\left[1 + \dfrac{5}{100}\right]^{4} = \dfrac{194481}{160000}P$

So, $\left[\dfrac{194481}{160000} - \dfrac{121}{100}\right]P = 220.25$

or, $\dfrac{194481 - 193600}{160000}P = 220.25$

or, $\dfrac{881}{160000}P = 220.25$

or, $P = \dfrac{160000}{881} \times 220.25$

or, P = Rs. 40,000.