Q6. Arif took a loan of Rs.80,000 from a bank. If the rate of interest is 10% per annum, find the difference in amounts he would be paying after $1\frac{1}{2}$ years if the interest is:

(i) compounded annually.

(ii) compounded half yearly.

Ans. (i) Here, Principal (P) = Rs. 80,000, Time (n) = $1\frac{1}{2}$ years, Rate of interest (R) = 10%

Amount for 1 year (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 80000\left(1+\frac{10}{100}\right)^1$

$= 80000\left(1+\frac{1}{10}\right)^1$

$= 80000\left(\frac{11}{10}\right)^1$

= Rs. 88,000

Interest for $\frac{1}{2}$ year $= \frac{88000\times10\times1}{100\times2}$

= Rs. 4,400

Total amount = Rs. 88,000 + Rs. 4,400 = Rs. 92,400

(ii) Here, Principal (P) = Rs.80,000,

Time $(n) = 1\frac{1}{2}$ year = 3 year (compounded half yearly)

Rate of interest (R) = 10% = 5% (compounded half yearly)

$$\text{Amount (A)} = P\left(1+\frac{R}{100}\right)^{n}$$

$$= 80000\left(1+\frac{5}{100}\right)^{3}$$

$$= 80000\left(1+\frac{1}{20}\right)^{3}$$

$$= 80000\left(\frac{21}{20}\right)^{3}$$

$$= 80000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$$

= Rs. 92,610

Difference in amounts

= Rs. 92,610 – Rs. 92,400 = Rs. 210

Q7. Maria invested Rs.8,000 in a business. She would be paid interest at 5% per annum compounded annually. Find:

(i) The amount credited against her name at the end of the second year.

(ii) The interest for the third year.

Ans. (i) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 2 years

$$\text{Amount (A)} = P\left(1+\frac{R}{100}\right)^{n}$$

$$= 8000\left(1+\frac{5}{100}\right)^2$$

$$= 8000\left(1+\frac{1}{20}\right)^2$$

$$= 8000\left(\frac{21}{20}\right)^2$$

$$= 8000\times\frac{21}{20}\times\frac{21}{20}$$

= Rs. 8,820

(ii) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 3 years

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

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

$$= 8000\left(1+\frac{1}{20}\right)^3$$

$$= 8000\left(\frac{21}{20}\right)^3$$

$$= 8000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$$

= Rs. 9,261

Interest for 3^{rd} year = A – P

= Rs. 9,261 – Rs. 8,820 = Rs. 441

Q8. Find the amount and the compound interest on Rs.10,000 for $1\frac{1}{2}$ years at 10% per annum, compounded half yearly.

Would this interest be more than the interest he would get if it was compounded annually?

Ans. Here, Principal (P) = Rs. 10000, Rate of Interest (R) = 10% = 5% (compounded half yearly)

Time $(n) = 1\frac{1}{2}$ years = 3 years (compounded half yearly)

Amount (A) = $P\left(1+\frac{R}{100}\right)^n$

$= 10000\left(1+\frac{5}{100}\right)^3$

$= 10000\left(1+\frac{1}{20}\right)^3$

$= 10000\left(\frac{21}{20}\right)^3$

$= 10000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 11,576.25

Compound Interest (C.I.) = A – P

= Rs. 11,576.25 – Rs. 10,000 = Rs. 1,576.25

If it is compounded annually, then

Here, Principal (P) = Rs. 10000, Rate of Interest (R) = 10%, Time $(n) = 1\frac{1}{2}$ years

Amount (A) for 1 year = $P\left(1+\frac{R}{100}\right)^n$

$= 10000\left(1+\frac{10}{100}\right)^1$

$= 10000\left(1+\frac{1}{10}\right)^1$

$= 10000\left(\frac{11}{10}\right)^1$

$= 10000\times\frac{11}{10}$

= Rs. 11,000

Interest for $\frac{1}{2}$ year $= \frac{11000\times1\times10}{2\times100}$ = Rs. 550

$\therefore$ Total amount = Rs. 11,000 + Rs. 550

= Rs. 11,550

Now, C.I. = A – P = Rs. 11,550 – Rs. 10,000

= Rs. 1,550

Yes, interest Rs. 1,576.25 is more than Rs. 1,550.

Q9. Find the amount which Ram will get on Rs.4,096, if he gave it for 18 months at $12\frac{1}{2}\%$ per annum, interest being compounded half yearly.

Ans. Here, Principal (P) = Rs. 4096,

Rate of Interest (R) = $12\frac{1}{2} = \frac{25}{2}\%$

$= \frac{25}{4}\%$ (compounded half yearly)

Time $(n) = 18$ months $= 1\frac{1}{2}$ years $= 3$ years

(compounded half yearly)

Amount (A) =

$$P\left(1+\frac{R}{100}\right)^{n}$$

$$= 4096\left(1+\frac{25}{4\times 100}\right)^{3}$$

$$= 4096\left(1+\frac{1}{4\times 4}\right)^{3}$$

$$= 4096\left(\frac{17}{16}\right)^{3}$$

$$= 4096\times\frac{17}{16}\times\frac{17}{16}\times\frac{17}{16}$$

= Rs. 4,913

Q10. The population of a place increased to 54,000 in 2003 at a rate of 5% per annum.

(i) Find the population in 2001.

(ii) What would be its population in 2005?

Ans. (i) Here, A_{2003} = Rs. 54,000, R = 5%, $n = 2$ years

Population would be less in 2001 than 2003 in two years.

Here population is increasing.

$$\therefore A_{2003} = P_{2001}\left(1+\frac{R}{100}\right)^{n}$$

$$\Rightarrow 54000 = P_{2001}\left(1+\frac{5}{100}\right)^{2}$$

$$\Rightarrow 54000 = P_{2001}\left(1+\frac{1}{20}\right)^{2}$$

$$\Rightarrow 54000 = P_{2001}\left(\frac{21}{20}\right)^{2}$$

$$\Rightarrow 54000 = P_{2001}\times\frac{21}{20}\times\frac{21}{20}$$

$$\Rightarrow P_{2001} = \frac{54000\times 20\times 20}{21\times 21}$$

$$\Rightarrow P_{2001} = 48{,}980 \text{ (approx.)}$$

(ii) According to question, population is increasing.
Therefore population in 2005,

$$A_{2005} = P\left(1+\frac{R}{100}\right)^{n}$$

$$= 54000\left(1+\frac{5}{100}\right)^{2}$$

$$= 54000\left(1+\frac{1}{20}\right)^{2}$$

$$= 54000\left(\frac{21}{20}\right)^{2}$$

$$= 54000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= 59{,}535$$

Hence population in 2005 would be 59,535.

Q11. In a laboratory, the count of bacteria in a certain experiment was increasing at the rate of 2.5% per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

Ans. Here, Principal (P) = 5,06,000, Rate of Interest (R) = 2.5%, Time (n) = 2 hours

After 2 hours, number of bacteria,

$$\text{Amount (A)} = P\left(1+\frac{R}{100}\right)^n$$

$$= 506000\left(1+\frac{2.5}{100}\right)^2$$

$$= 506000\left(1+\frac{25}{1000}\right)^2$$

$$= 506000\left(1+\frac{1}{40}\right)^2$$

$$= 506000\left(\frac{41}{40}\right)^2$$

$$= 506000 \times \frac{41}{40} \times \frac{41}{40}$$

$$= 5{,}31{,}616.25$$

Hence, number of bacteria after two hours are 531616 (approx.).

Q12. A scooter was bought at Rs.42,000. Its value depreciated at the rate of 8% per annum. Find its value after one year.

Ans. Here, Principal (P) = Rs. 42,000, Rate of Interest (R) = 8%, Time $(n) = 1$ years

$$\text{Amount (A)} = P\left(1-\frac{R}{100}\right)^{n}$$

$$= 42000\left(1-\frac{8}{100}\right)^{1}$$

$$= 42000\left(1+\frac{2}{25}\right)^{1}$$

$$= 42000\left(\frac{27}{25}\right)^{1}$$

$$= 42000\times\frac{27}{25}$$

$$= \text{Rs. } 38{,}640$$

********** END **********