Q.1) Which amongst the following two offers is the better one?

(1) investing an amount compounded annually at 1% per annum for 100 years.

(2) investing the amount compounded annually at 100% per annum for 1 year.

[a] first offer

[b] second offer

[c] both are same

[d] cannot be determined

Solution (a)
The option of investing at 1% for 100 years is obviously better than investing at 100% for 1 year, because the total compound interest for 100 years will be at least 100% of the total amount (1% for each year)), plus whatever the compounding effect will have.
Q.2) If the compound interest on a certain sum for 2 years at 4% p.a. is RS. 102, the simple interest at the same rate of interest for two years would be:

[a] RS. 200
[b] RS. 50
[c] RS. 150
[d] RS. 100

Solution (d)

By using effective percent method:

\[(a + b + (a \times b / 100))\]

Here, \(a = 4\%\)

Combined rate of interest of CI for 2 years = \(4 + 4 + (4 \times 4 / 100) = 8.16\%\)

SI for two years = \(2 \times 4 = 8\%\)

According to the question,

SI for two years = \(102/8.16 \times 8 = RS.100\) (ans.)
Q.3) On what sum does the difference between the compound interest and the simple interest for 3 years at 10% is RS. 31?

[a] RS. 1500
[b] RS. 1200
[c] RS. 1100
[d] RS. 1000

Solution (d)

By using effective percent method: 

\[ (a + b + a \times b/100) \]

CI for 2 years = 10 + 10 + (10 \times 10/100) = 21%

CI for 3 years = 10 + 21 + (21 \times 10 / 100) = 33.1%

SI for 3 years = 3 \times 10 = 30%

Difference in CI and SI = 33.1 - 30 = 3.1%

3.1 % of the sum = RS.31

100% = 31 \times 100/3.1 = RS.1000 (ans.)
Q.4) If the amount is 2.25 times of the sum after 2 years at compound interest (compounded annually), the rate of interest per annum is:

[a] 25%
[b] 30%
[c] 45%
[d] 50%

Solution (d)

Let the principal = RS. P
Time = 2 years
Amount = RS. 2.25 P
Let rate% = R%

By using formula,

\[2.25P = P \left[1 + \frac{R}{100}\right]^2\]

\[\frac{225}{100} = \left[1 + \frac{R}{100}\right]^2\]

\[\left[\frac{15}{10}\right]^2 = \left[1 + \frac{R}{100}\right]^2\]

\[\frac{15}{10} = 1 + \frac{R}{100}\]

\[\frac{R}{100} = \frac{5}{10}\]

\[R = 50\% \text{ (ans.)}\]
Q.5) What is the difference between compound interest on RS. 5,000 for 1 1/2 years at 4% per annum, the interest is compounded yearly and half yearly?

[a] RS. 2.04
[b] RS. 3.06
[c] RS. 8.30
[d] RS. 4.80

Solution (a)

By using effective percent method: \((a + b + (a \times b/100))\)

Case I = When interest is calculated yearly

Effective rate % = 4 + 2 + (4 x 2/100) = 6.08%

Case II = when interest is calculated half yearly

Rate % = 4/2 = 2%

Time = 3/2 x 2 = 3 years
Q.6) Ramu borrowed Rs. 40,000 from a bank at 15% compound interest, compounded annually. At the end of the first year he paid Rs.10,000 and at the end of the second year he paid Rs.15,000. At the end of the third year, he wanted to clear the loan. How much should he pay to clear the loan?

[a] Rs.27,360
[b] Rs. 28,360
[c] Rs. 29,360
[d] Rs. 30,360

Solution (d)

Amount outstanding at the end of the first year
= Rs.40,000 + 15% of 40,000(6,000)
= Rs.46,000

Amount outstanding before the second year
= Rs.46,000 – 10,000 = Rs. 36,000

Amount outstanding at the end of the second year
= Rs.36,000 + 15% of Rs.36,000(5,400)
= Rs. 41,400

Amount outstanding at the beginning of the third year
= Rs.41,400 – 15,000 = Rs. 26,400

Amount outstanding at the end of the third year
= Rs.26,400 + 15% of 26,400(3,960)
= Rs.30,360 (ans.)
Q.7) A man borrowed a certain sum under compound interest compounded annually, from a bank. The compound interest for the second year and the third year are Rs.3,840 and Rs.4,608 respectively. Find the sum.

[a] Rs.14,000  
[b] Rs.16,000  
[c] Rs.18,000  
[d] Rs.20,000

Solution (b) 
Difference between the interest of second year and third year 
= 4608 – 3,840

= Rs.768 is the interest upon the second year interest i.e. Rs.3,840

Rate of interest = 768 x 100 / 3,840

= 20%

Rs. 3,840 is included 20% of the sum + 20% of 20% (4%) as compound interest 

So 3,840 is 24%

100 % = 3840 x 100 / 24

= Rs. 16,000 (ans)
Q.8) A man borrowed Rs.20,000 at the rate of 8% p.a. compounded annually. How much should he repay at the end of the first year, so that he has to repay Rs. 10,800 only at the end of the second year to clear the loan?

[a] Rs. 11,600  
[b] Rs. 11,200  
[c] Rs. 10,800  
[d] Rs. 10,400

Solution (a)

At the end of the first year the sum amounts to $20,000 + 8\% \times 20,000(16,00) = Rs.21,600$

He wants to pay only Rs. 10,800 (principal + interest)

Principal + interest = 108%  
108% = 10,800  
100% = 10,800 \times 100 / 108  
=10,000 (principal)  
21,600 – 10,000 = Rs.11,600 (ans)
Q.9) The difference between the simple interest and the compound interest with interest being compounded annually on a certain sum at 20% per annum for 3 years is Rs.1,152. Find the sum.

[a] Rs. 9,500
[b] Rs.10,000
[c] Rs.9,000
[d] Rs. 8,000

Solution (c)

Let P = 100
S.I. for 3 years = 3 x 20 = Rs.60
C.I. for 3 years = 20 + 24 + 28.8 = Rs.72.8
Difference = 72.8 - 60 = 12.8
When the difference is Rs. 1152
P = (1152 / 12.8) x 100 = Rs.9,000 (ans.)
Q.10) A sum of money under compound interest, interest being compounded half yearly, doubles itself in 3 years. In how many years will it become 32 times itself?

[a] 48 years  
[b] 24 years  
[c] 12 years  
[d] 15 years

Solution (d)

The amount doubles in 3 years.

X becomes 2X in 3 years

2X becomes 4X in next 3 years

4X becomes 8X in next 3 years

8X becomes 16X in next 3 years

16X becomes 32X in next 3 years

Total years taken = 15 years to become 32 times of itself.