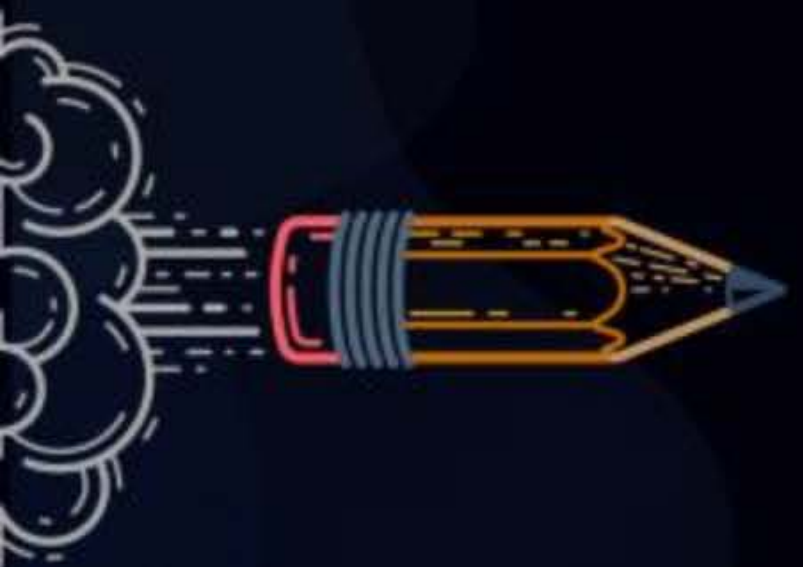




PYQ Series

CA Foundation



Lecture No.- 2

Mathematics of Finance

By- Rahul Bhutani Sir



TODAY'S TARGETS



Last 4 Attempt PYQs

Q.1

Mr. X wants to accumulate Rs. 50,00,000 at the end of 10 years. Then how much amount is required to be invested every year if interest is compounded annually at 10% (Given that $P(10, 0.10) = 15.9374298$)

[Dec 2021]

A 3,13,726.87 ✓

B 4,13,726.87

C 3,53,726.87

D 4,53,726.87

$C=1, t=10y, r=10%$

$F = ₹ 50,00,000$

$A = ?$ $i = \frac{10}{100 \times 1} = 0.1, n = 10 \times 1 = 10$

$$F = A \times \frac{((1 + 0.1)^{10} - 1)}{0.1} \rightarrow 15.9374298$$

$$A = \frac{50,00,000}{15.9374298} = ₹ 3,13,726.9$$

Q.2

S deposits an amount in bank which gives 10% compound interest, compounded annually for 5 years. What is effective rate of simple interest?

[Dec 2021]

A 12.21

B 11.11

C 13.21

D 12.81

For 5 yr → A = P + CI

P = ₹ 100

A = P + 10% + 10% + 10% + 10% + 10%

A = 161.051

→ SI → rate of interest

161.051 = 100 (1 + r/100)^5

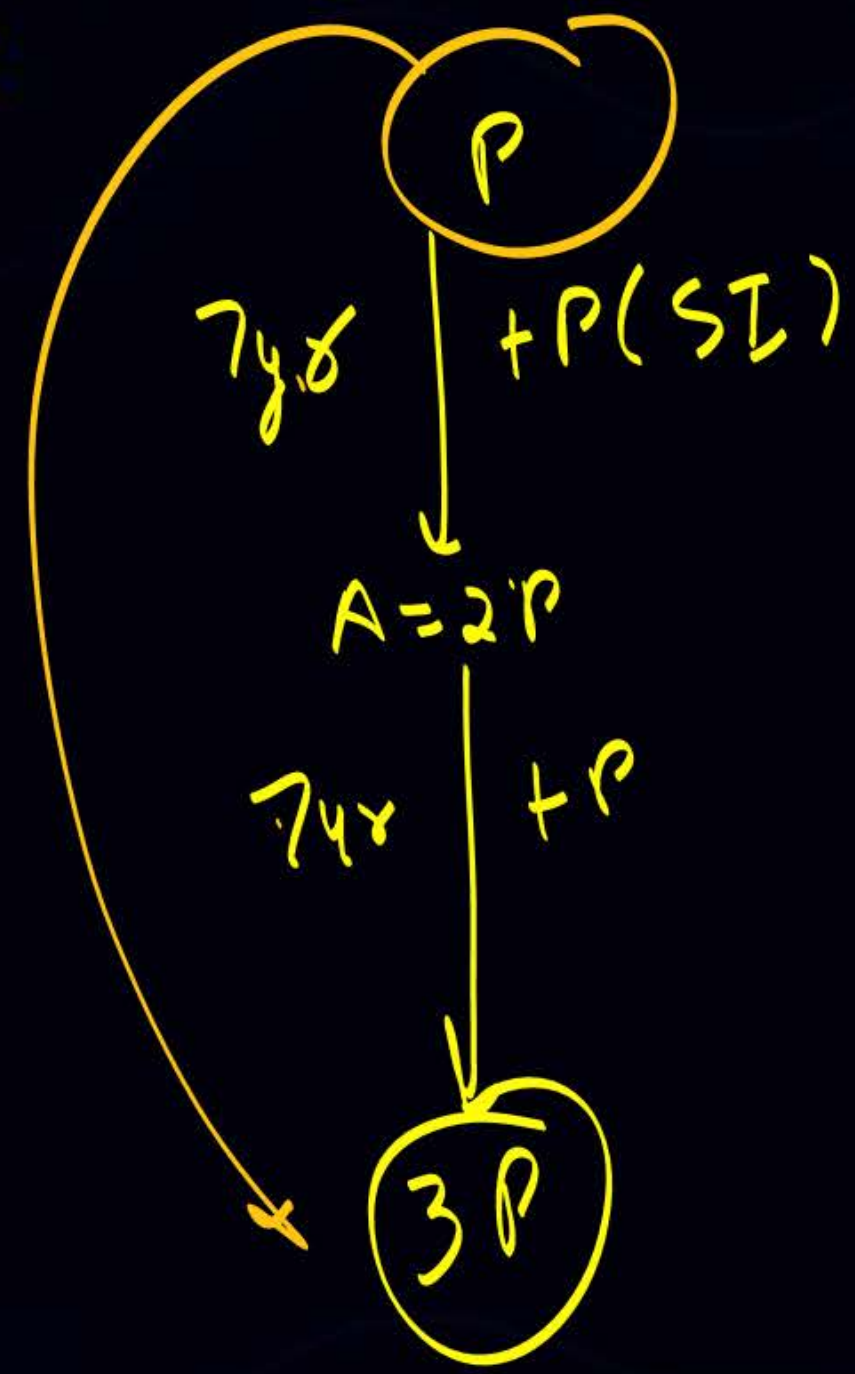
r = 12.2102

Q.3

A sum of money in simple interest doubles itself in 7 years. How many years will it take to triple itself?

[Dec 2021]

- A** End of 12 years
- B** End of 14 years
- C** End of 18 years
- D** End of 16 years



$$7 + 7 = 14$$

Q.4

Cost of a laptop is ₹1, 10, 000 and its value depreciate 12% annually its life is 6 years its scrap value.....times its cost

[Dec 2021]

$P = ₹110000, r = -12\%$

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

$$A = 110000 \left(1 - \frac{12}{100} \right)^6$$

$$= 110000 (0.88)^6$$

$$= 110000 (0.4644)$$

A

0.464

B

0.42

C

0.45

D

0.48

Q.5

Simple interest on a sum of money is amount to ₹59,000 in 3 years and ₹62,000 in 4 years at same rate of interest. What are the principal amount and rate of interest?

[Dec 2021]

A

50,000, 6%

B

45,000, 5.5%

C

55,000, 5%

D

52,000, 7%

$50000 \times 6 = 300000$
+SI

$A_3 \Rightarrow t = 3 \text{ yr.}$ 59000
 $A_4 = t = 4 \text{ yr.}$ 62000

SI of 1 yr = 62000 - 59000
 $\frac{P \times r \times 1}{100} = 3000$

$P r = 300000$

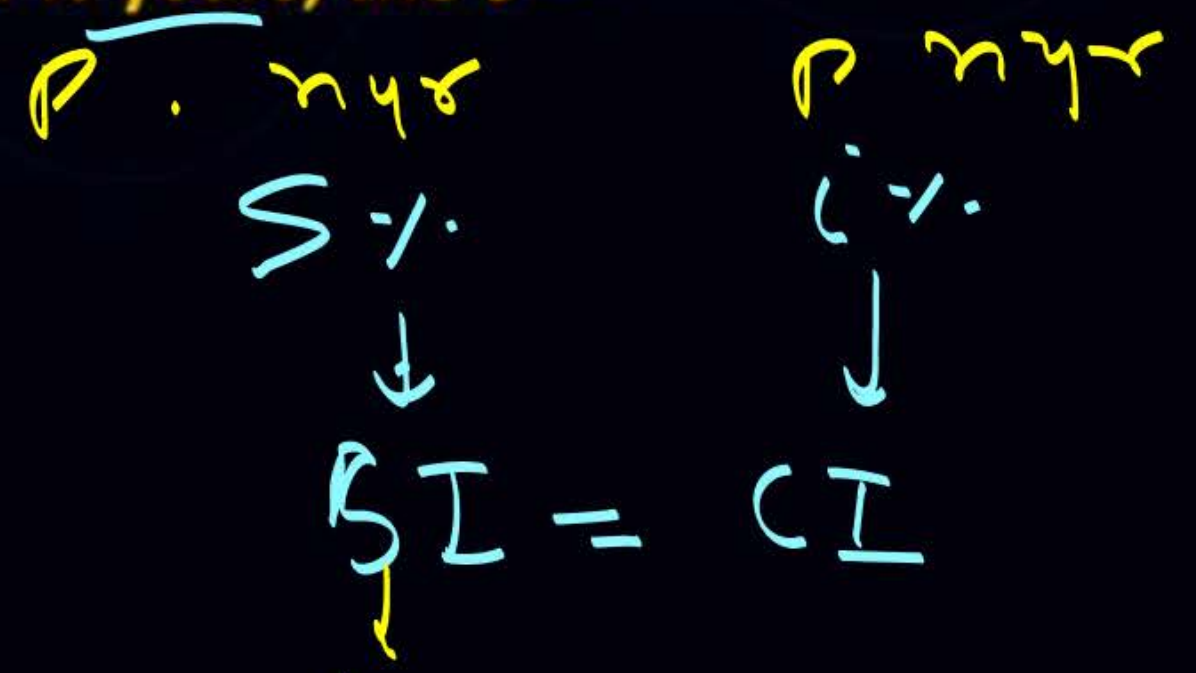
Q.6

If the compound interest earned at $i\%$ p.a. in n years is to be earned at $s\%$ simple interest rate for n years, the $s =$

[Dec 2021]

$\rightarrow i \rightarrow dec$

$s \rightarrow dec$



$$\frac{P(s) \times n}{100} = \frac{P \left(\left(1 + \frac{i}{100}\right)^n - 1 \right)}{100}$$

$$s = \frac{1}{n} \left(\left(1 + \frac{i}{100}\right)^n - 1 \right) \times 100$$

A i

B $i \frac{1}{n}$

C $\frac{(1 + \frac{i}{100})^n - 1}{n} \times 100$ ✓

D $\frac{1 - (1 + i)^n}{n}$

Q.7

A company needs ₹10,000 in five years to replace as equipment. How much (in ₹) must be invested now at the interest rate of 8% p.a. in order to provide for the equipment?

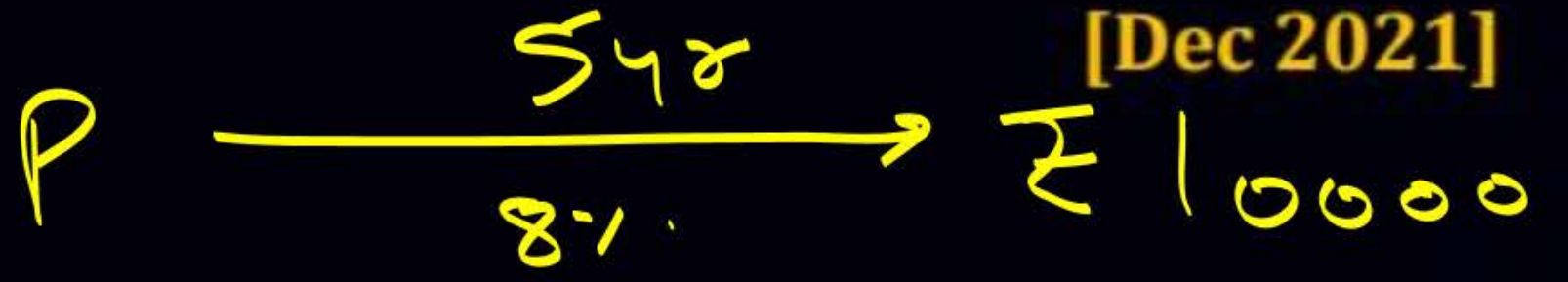
[Dec 2021]

A 6,606

B 6,806

C 10,500

D 11,500



$$10000 = P \left(1 + \frac{8}{100}\right)^5$$

$$P = \frac{10000}{(1.08)^5} = 6805.8$$

$$10000 \div 1.08 = \dots$$

Q.8

It needs to pay ₹5,00,000 after 10 years. He invested a sum in a scheme at 9% rate of interest compounded half-yearly. How much amount (in ₹) he invested? ($1.045^{20} = 2.41171$)

[Dec 2021]

A ₹397321

B ₹207321

C ₹297321

D ₹340321

$C=2, t=10, r=9\%$



$500000 = P \left(1 + \frac{9}{100 \times 2}\right)^{2 \times 10}$

$500000 = P (1.045)^{20}$

$P = \frac{500000}{2.41171} = 207321.77$

Q.9

An amount is lent at $R\%$ simple interest for R years and the simple interest amount was one fourth of the principal amount. Then R is.....

[Dec 2021]

A 5

B 6

C $5\frac{1}{2}$

D $61\frac{1}{2}$

$$SI = \frac{1}{4}P$$

$$\frac{P(RR)}{100} = \frac{1}{4}P$$

$$R^2 = \frac{100}{4} = 25$$

$$\underline{R = 5}$$

Q.10 A sum of money is put at 20% compound interest rate p.a. At which year the aggregated amount just exceeds the double of the original sum?

[Dec 2021]

A 5

B 6

C 4

D 3

$$r = 20\%$$

$$A \approx 2P$$

$$2P = P \left(1 + \frac{20}{100}\right)^t$$

$$2 = (1.2)^t \Rightarrow (1.2)^4 = (1.2)^t \Rightarrow t = 4$$

$$\begin{array}{r} 0.5 \\ \hline 1.2 \times = = - \end{array} \quad (1.2)^4 = 2.0736$$

Q.11

The present value of ₹25,000 to be received after 10 years at 6% per annum compounded annually is ₹ $(1.06)^5 = (1.33823)^2$

[Dec 2021]

A 15,960

B 13,960 ✓

C 11,960

D 17,960



$$25000 = P \left(1 + \frac{6}{100}\right)^{10}$$

$$25000 = P (1.06)^{10}$$

$$P = \frac{25000}{(1.06)^{10}} = 25000 \times \frac{1}{(1.06)^{10}} \rightarrow 13959.8$$

Reciprocal

$$\therefore = \frac{1}{1.06^{10}} \times 25000$$

Q.12

Raj made an investment of Rs. 15,000 in a scheme and at the time of maturity the amount was Rs. 25,000. If Compound Annual Growth Rate (CAGR) for this investment is 8.88%. Calculate the approximate number of years for which he has invested the amount.

A 6

B 7.7

C 5.5

D 7

$$CAGR = \left(\frac{V_n}{V_0} \right)^{\frac{1}{n}} - 1 \times 100 \quad \text{[June 2022]}$$

$$\Rightarrow 8.88 = \left(\frac{25000}{15000} \right)^{\frac{1}{n}} - 1 \times 100$$

$$(1.0888)^n = 1.666$$

$$\Rightarrow (1.0888)^n = (1.6666)^{\frac{1}{6}}$$

$$\Rightarrow (1.0888)^n = 1.6666 \Rightarrow (1.0888)^6$$

$$\Rightarrow n = 6$$

Q.13

Madhu takes a loan of Rs. 50,000 from XYZ Bank. The rate of interest is 10% per annum. The first instalment will be paid at the end of year 5. Determine the amount (in Rs.) of equal instalments, if Madhu wishes to repay the amount in five instalments?

[June 2022]

- A** Rs. 19,510
- B** Rs. 19,430
- C** Rs. 19,310
- D** Rs. 19,630

$C = 1$
 $i = \frac{10}{100} = 0.1$

$50000 + 10\% + 10\% + 10\% + 10\% = 73205$

$$73205 = A \left(\frac{(1+0.1)^5 - 1}{0.1(1.01)^5} \right)$$

$\Rightarrow A = \underline{19311}$

$73205 \times \frac{0.1}{0.1(1.01)^5} =$

A

Q.14

Ramesh invests Rs. 20,000 per year in a stock index fund, which earns 9% per year, for the next ten years. What would be the closest value of the accumulated value of the investment upon payment of the last instalment?
($1.09^{10} = 2.36736$)

A Rs. 3,88,764.968

B Rs. 3,03,858.594

C Rs. 2,68,728.484

D Rs. 4,08,718.364

$i = \frac{9}{100} = 0.09$

$FV \rightarrow$ Day of last payment
[June 2022]

$n = 10 \times 1 = 10$
 $FV = A \frac{(1+i)^n - 1}{i}$

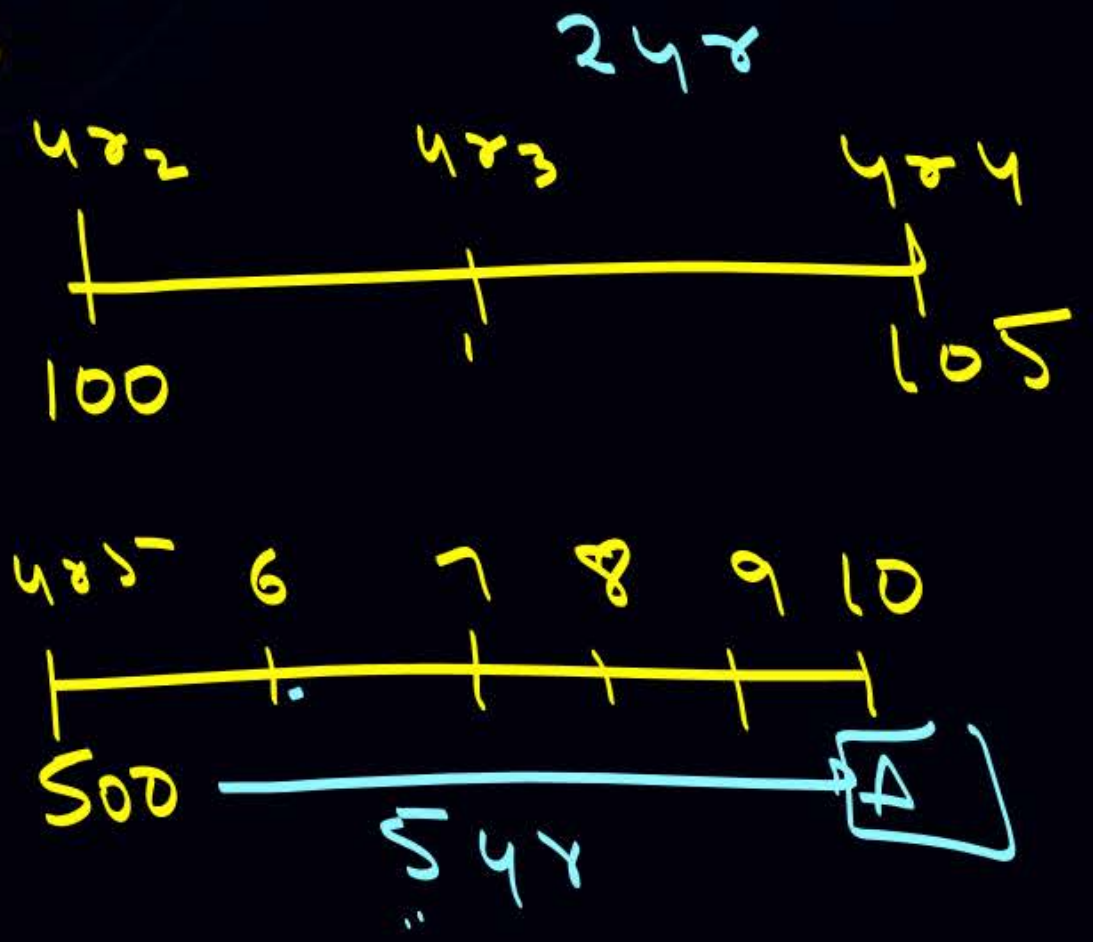
$FV = 20000 \frac{(1+0.09)^{10} - 1}{0.09}$
 $= 303857.78$

Q.15

An investment is earning compound interest, Rs. 100 invested in the year 2 accumulated to Rs. 105 by year 4. If Rs. 500 invested in the year 5, will become Rs.....by year 10.

- A** 364.80
- B** 564.80
- C** 464.80
- D** 664.80

[June 2022]



$$105 = 100 \left(1 + \frac{r}{100}\right)^2$$

$$\sqrt{1.05} = \left(1 + \frac{r}{100}\right)$$

$$A = 500 \left(1 + \frac{r}{100}\right)^5$$

$$= 500 \left(\sqrt{1.05}\right)^5 = 564.80$$

CA Wallah → Top 12 Calculator Trick ⇒



Q.16 An investor is saving to pay off an obligation of Rs. 15,250 which will be due in seven years, if the investor is earning 7.5% simple interest rate per annum, he must deposit Rs. _____ to meet the obligation.

[June 2022]

A 8,000

B 9,000

C 10,000

D 11,000



$$15250 = P \left(1 + \frac{7.5 \times 7}{100} \right)$$

$$P = \frac{15250}{1.525} = 10000$$

Q.17

There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 12,000 after 3 years at the same rate?

[June 2022]

A Rs. 3,972

B Rs. 2,160

C Rs. 3,120

D Rs. 3,742

$60\% \rightarrow \text{SI} \rightarrow 648$
 $148 \rightarrow \text{SI} \Rightarrow \frac{60}{6} = 10\% \text{ p.a.}$
 $(I = [12000 + 10\% + 10\% + 10\%] - 12000)$
 $= 3972$

Q.18 The present value of Rs. 2,000, after 8 years at the rate of 6% per annum, is _____. ($1.06^8 = 1.59385$)

[June 2022]

$$2000 = PV \left(1 + \frac{6}{100}\right)^8$$

$$PV = \frac{2000}{(1.06)^8} = \underline{1254.8}$$

A Rs. 1,054

B Rs. 1,254

C Rs. 3,054

D Rs. 2,054

Q.19 The annual rate of simple interest is 12.5%. In how many years does the principal double?

[June 2022]

$$P \xrightarrow[t]{12.5\%} 2P$$

$$2P = P \left(1 + \frac{12.5 \times t}{100} \right)$$

$$2 - 1 = \frac{12.5 \times t}{100}$$

$$t = \frac{1 \times 100}{12.5} = \underline{80}$$

A 11 years

B 9 years

C 8 years

D 7 years

Q.20

A company creates a sinking fund of Rs. 2,00,000 in a bank account for 15 years bank offers interest rate 6% per annum, the yearly payment to be paid by company is approximately (if need, use: $1.06^{15} = 2.2609$)

FV

$$i = \frac{6}{100 \times 1} = 0.06, \quad n = 15 \times 1 = 15$$

[June 2022]

$$\frac{A((1+0.06)^{15}-1)}{0.06} = 200000$$

$$A \left(\frac{(1.06)^{15}-1}{0.06} \right) = 200000$$

$$A = \underline{\underline{8592.55}}$$

A Rs. 8592

B Rs. 8,145

C Rs. 9,345

D Rs. 9,645

Q.21

A machine worth Rs 4,90,740 is depreciated at 15% on its opening value each year. When its value would reduce to Rs. 2,00,750

[Dec 2022]

- A** 5 years 5 months
- B** 5 years 6 months
- C** 5 years 7 months
- D** 5 years 8 months

$$200750 = 490740 \left(1 - \frac{15}{100}\right)^n$$

$$\log 0.409076 = \log (0.85)^n$$

$$n = \frac{\log 0.409076}{\log 0.85} = \frac{-0.388165}{-0.076576} = 5.5$$

$$5.548 = 548 \times 0.548 \Rightarrow 548 (0.5 \times 12 \text{ months}) \Rightarrow 548 \text{ months}$$

Q.22

If Rs 64 Amount to Rs. 83.20 in 2 years, what will Rs 86 Amount to in 4 years at the same Rate percent per annum ?

[Dec 2022]

A

Rs 127.60

B

Rs 147.60

C

Rs 145.34

D

Rs 117.60

$$83.2 = 64 (1+i)^2$$
$$(1+i)^2 = \frac{83.2}{64}$$

$$((1+i)^2)^2 = (1.3)^2$$
$$\Rightarrow (1+i)^4 = 1.69$$

$$A = 86(1+i)^4$$

$$A = 86 \times 1.69 = 145.34$$

Q.23

A farmer borrowed Rs. 3600 at the rate of 15% simple interest per Annum. At the end of 4 years, he cleared this account by paying Rs. 4000 and a cow. The cost of the cow is:

[Dec 2022]

A

Rs. 1000

B

Rs. 1200

C

Rs. 1550

D

Rs. 1760

$$A = 3600 \left(1 + \frac{15 \times 4}{100}\right)$$

$$A = 5760$$

$$4000 + \text{Cow} = 5760$$

$$\Rightarrow \text{Cow} = 5760 - 4000$$

$$= \underline{1760}$$

Q.24

How much amount is required to be invested every year so as to accumulate Rs. 5,00,000 at the end of 12 years if interest is compounded annually at 10% {Where $A(12,0.1) = 21.384284$ }

[Dec 2022]

$n=12$

$r = 10\%$, $i = \frac{10}{100} = 0.1$

A Rs. 23381.65

B Rs. 24385.85

C Rs. 26381.65

D Rs. 28362.75

$$A \left(\frac{(1 + 0.1)^{12} - 1}{0.1} \right) = 500000$$

$$A = \frac{500000}{21.384284} = ₹ 23381.657$$

Q.25

The effective annual rate of interest corresponding to a normal rate of 6% per annum payable half yearly is:

 $n=2$

[Dec 2022]

A 6.06%

B 6.07%

C 6.08%

D 6.09%

$$\begin{aligned} \text{ERI} &= \left(\left(1 + \frac{6}{2 \times 100} \right)^2 - 1 \right) \times 100 \\ &= \underline{6.09\%} \end{aligned}$$

Q.26

10 years ago the earning per share (EPS) of ABC Ltd. was Rs. 5 share Its EPS for this year is Rs. 22. Compute at what rate, EPS of the company grow annually ?

[Dec 2022]



$$\begin{aligned}
 \text{CAGR} &= \left(\left(\frac{22}{5} \right)^{\frac{1}{10}} - 1 \right) \times 100 \\
 &= \underline{15.97\%}
 \end{aligned}$$

A

15.97%

B

16.77%

C

18.64%

D

14.79%

Q.27

Mr. A invested Rs. 10,000 every year for next 3 years at the interest rate of 8 percent per annum compounded annually. What is future value of the annuity?

[Dec 2022]

10000 10000 10000

$$FV = 10000 \frac{(1 + 0.08)^3 - 1}{0.08}$$
$$= 32464$$

A

Rs. 32644

B

Rs. 32464

C

Rs. 34264

D

Rs. 36442

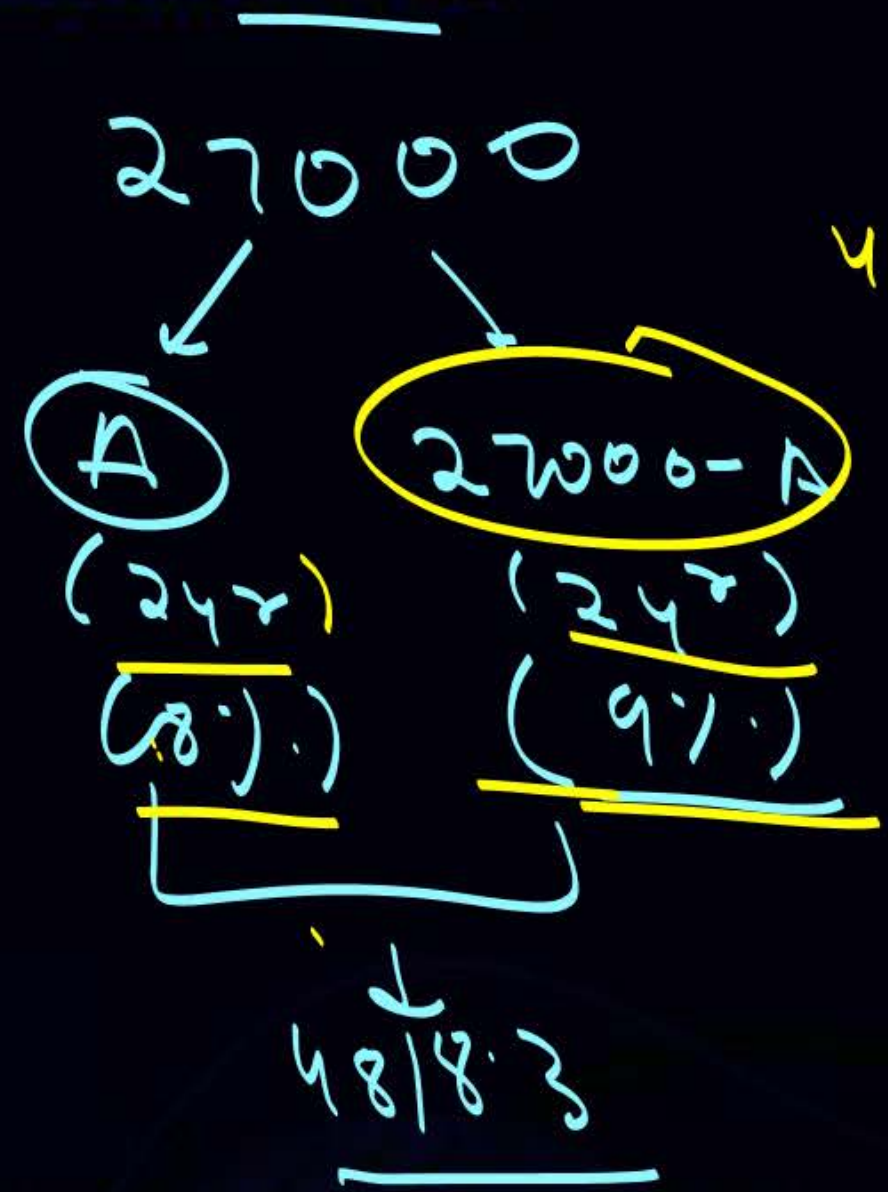
Q.28

Mr. Prakash invested money in two schemes 'A' and 'B' offering compound interest at the rate of 8% and 9% per annum respectively. If the total amount of interest accrued through these two schemes together in two years was Rs. 4818.30 and total amount invested was Rs. 27,000. What was the amount invested in schemes 'A'?

[Dec 2022]

- A**
- B**
- C**
- D**

	A	27000 - A
Rs. 12,000	15000	
	1996.8	+ 2821.5
Rs. 12,500	14500	
Rs. 13,000	14000	
Rs. 13,500	13500	



$$4818.3 = A \left(1 + \frac{8}{100}\right)^2 + (27000 - A) \left(1 + \frac{9}{100}\right)^2$$

Q.29

A sum of money invested of compound interest double itself in four years. In how many years it become 32 times of itself at the same rate of compound interest

[Dec 2022]

- A** 12 years
- B** 16 years
- C** 20 years
- D** 24 years

$$2P = P(1+i)^4 \quad \text{--- (1)}$$

$$2 = (1+i)^4$$

$$32P = P(1+i)^n$$

$$\left((1+i)^4 \right)^5 = (1+i)^n \Rightarrow 4 \times 5 = n \Rightarrow n = \underline{20}$$

Q.30

The difference between compound interest and simple interest on an amount of Rs. 15,000 for 2 years is Rs. 96. What is the rate of interest per Annam ?

[Dec 2022]

A

9%

B

8%

C

11%

D

10%

$$P \left(\left(1 + \frac{r}{100}\right)^t - 1 - \frac{rt}{100} \right) = 96$$

$$\frac{15000}{1} \left(\left(1 + \frac{r}{100}\right)^2 - 1 - \frac{2r}{100} \right) = 96$$

$$15000 \left(\cancel{1} + \left(\frac{r}{100}\right)^2 + \cancel{2\frac{r}{100}} - \cancel{\frac{2r}{100}} \right) = 96$$

$$\left(\frac{r}{100}\right)^2 = \frac{96}{15000}$$

$$\frac{r}{100} = \sqrt{0.0064} \Rightarrow r = 0.08 \times 100 = 8\%$$

Q.31

Rs. 5,000 is invested every month and in an account paying interest @ 12% per annum compounded monthly. What is the future value of this annuity just after making 11th payment" (Given that $(1.01)^{11} = 1.1156$)

[Dec 2022]

A Rs. 57,800

B Rs. 56,100

C Rs. 56,800

D Rs. 57,100

$$c = 12$$

$$i = \frac{12}{100 \times 12} = 0.01$$

$$n = 11$$

$$A(11, 0.01) = 5000 \left(\frac{(1 + 0.01)^{11} - 1}{0.01} \right)$$

$$= 50000 \left((1.01)^{11} - 1 \right)$$

$$= \underline{57800}$$

Q.32

A sum of money doubles itself in 4 years at certain compound interest rate. In how many years this sum will become 8 times at the same compound interest rate

[Dec 2022]

A

12 years

**B**

14 years

C

16 years

D

18 years

$$2P = P(1+i)^4$$

$$8P = P(1+i)^n$$

Q.33

Sinking fund factor is the reciprocal of :

[Dec 2022]

A

Present value interest factor of a single cash flow

B

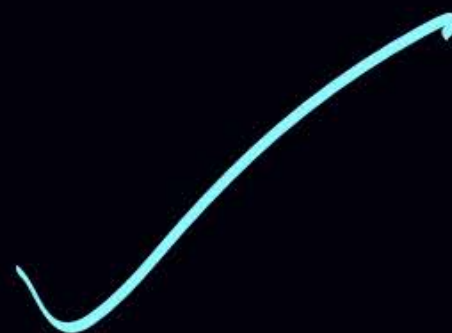
Present value interest factor of an annuity

C

Future value interest factor of an annuity

D

Future value interest factor of a single cash flow.



Q.34

The Nominal rate of interest is 10% per annum. The interest is compounded quarterly. The effective rate of interest per annum will be [June 2023]

$C=4$

- A** 10%
- B** 10.40%
- C** 10.25%
- D** 10.38%

$$\begin{aligned}
 \text{ERI} &= \left(\left(1 + \frac{10}{100 \times 4} \right)^4 - 1 \right) \times 100 \\
 &= \left((1.025)^4 - 1 \right) \times 100 \\
 &= \underline{10.38\%}
 \end{aligned}$$

Q.35

A car is available for ₹4,98,200 cash payment or ₹60,000 cash down payment followed by three equal annual instalments. If the rate of interest charged is 14% per annum compounded yearly, then total interest charged in the instalment plan is (Given $P(3, 0.14) = 2.32163$)

[June 2023]

- A** ₹ 1,46,314
- B** ₹ 1,46,137
- C** ₹ 1,28,040
- D** ₹ 1,58,040

without int.

498200

60000 + A + A + A \Rightarrow *with int*

498200
- 60000

438200

$\Rightarrow 438200 = A \left(\frac{(1+0.14)^3 - 1}{0.14(1.014)^3} \right)$

$A = \frac{438200}{2.32163} = 188746.7$

$\rightarrow 626240$ *PV*
- 498200

I = 128040

Q.36

The compound interest on ₹15,625 for 9 months at 16% per annum compounded quarterly is

[June 2023]

A ₹ 1,851

B ₹ 1,941

C ₹ 1,951

D ₹ 1,961

$a \rightarrow 4$

$t = 9 \text{ months} = \frac{9}{12} \times 48$

$n = \frac{3m + 3m + 3m}{3}$

$\frac{4 \times 4}{3} = 3$

$i = \frac{16}{100 \times 4} = 0.04$

$i\% = 0.04 \times 100 = 4\%$

$CI = P((1+i)^n - 1)$

$CI = (15625 + \underbrace{4\% + 4\% + 4\%}_{n=3}) - 15625$

= 1951

Q.37

If the discount rate is 10% p.a. how much would you pay to receive ₹2500 growing at 8% annually forever?

[June 2023]

A ₹ 1,25,000 ✓

B ₹2,50,000

C ₹1,50,000

D ₹2,00,000

$$\begin{aligned} PV A_{\infty} &= \frac{2500}{0.10 - 0.08} \\ &= \frac{2500}{0.02} = \underline{125000} \end{aligned}$$

Q.38

Mr. Sharad got his retirement benefits amounting to ₹50,00,000. He wants to receive a fixed monthly sum of amount for his rest of life, starting after one month and thereafter he wants to pass on the same to future generation. He expects to earn an interest of 9% compounded annually. Determine how much perpetuity amount he will receive every month?

[June 2023]

- A** ₹39,500
- B** ₹38,500
- C** ₹37,500
- D** ₹36,600



$$50,00,000 = \frac{A}{0.0075}$$

$$A = 50,00,000 \times 0.0075$$
$$= \underline{\underline{37,500}}$$

Q.39

Jonny wants to have ₹2,00,000 in his saving account after three years. The rate of interest offered by bank is 8% per annum compounded annually. How much should he invest today to achieve his target amount?

[June 2023]

- A** ₹1,47,489.10
- B** ₹1,58,766.44 ✓
- C** ₹ 1,71,035.59
- D** ₹1,84,417.96



$$200000 = P \left(1 + \frac{8}{100} \right)^3$$

$$P = \frac{200000}{(1.08)^3} = 158766.45$$

Q.40

Suppose you have decided to make a Systematic Investment Plan (SIP) in a mutual fund with ₹1,00,000 every year from today for next 10 years at the rate of 10% per annum compounded annually. What is the future value of this annuity? Given $1.1^{10} = 2.59374$ $i = \frac{10}{100} = 0.1$ $n = 10 \times 1 = 10$
[June 2023]

- A** ₹17,35,114
- B** ₹17,53,411
- C** ₹17,35,411
- D** ₹ 17,53,114

$\frac{AT}{1}$

$$FV = 100000 \left(\frac{(1 + 0.1)^{10} - 1}{0.1} \right) \times 1.1$$

$$= 1753116.7$$



Q.41

Mr. Ram invested a total of ₹1,00,000 in two different banks for a fixed period. The first bank yields an interest of 9% per annum and the second at 11% per annum. If the total interest at the end of one year is 9.75% per annum, then the amount invested in these banks are respectively

[June 2023]

- A** ₹52,500, ₹47,500
- B** ₹62,500, ₹37,500
- C** ₹57,500, ₹42,500
- D** ₹67,500, ₹32,500

Handwritten solution:

11% → 1.25
 9% → 0.75

$9.75 + 0.75 = 10.5$

$\frac{0.75}{1.25 + 0.75} = \frac{x}{100000}$

$x = \frac{0.75}{2} \times 100000 = 37500$

SI = CI

$$\downarrow$$
$$\frac{x \times 9 \times 1}{100} + \frac{(100000 - x) \times 11 \times 1}{100} = \frac{100000 \times 9.75 \times 1}{100}$$

Q.42

A company wants to replace its existing machine at the end of 10 years. The expected cost of machine would be ₹10,00,000. If the management creates a sinking fund, how much provision needs to be made at the end of each year which can earn at the interest rate of 10% compounded annually.

Given $A(10, 0.1) = 15.937425$

↓
AR

- A** ₹74,625
- B** ₹72,514
- C** ₹62,745 ✓
- D** ₹67,245

$i = \frac{10}{100} = 0.1, n = 10 \times 1 = 10$ [June 2023]

$$10,00,000 = A \frac{(1+0.1)^{10} - 1}{0.1}$$

$$A = \frac{10,00,000 \times 0.1}{15.937425} = \underline{\underline{62,745.4}}$$

Q.43

A machine depreciates at 10% of its value at the beginning of a year. The cost and scrap value realized at the time of sale being ₹23,240 and ₹9,000 respectively. For how many years the machine was put to use?

Compound

[June 2023]

- A** 7
- B** 8
- C** 9
- D** 10

$$9000 = 23240 \left(1 - \frac{10}{100}\right)^n$$

$$\frac{9000}{23240} = (0.9)^n$$

$$\Rightarrow 0.38726 = (0.9)^n = (0.9)^9$$

$$10 = \boxed{\frac{n+1}{0.9 \times \dots}} \quad 10 \cdot 0.9^9 = 0.3874$$

Q.44

The difference between C.I and S.I on a certain sum of money invested for 3 years at 6% pa is 110.16 . The principle is

[June 2023]

$$P \left((1 + 0.06)^3 - 1 - \frac{6 \times 3}{100} \right) = 110.16$$

$$P (0.011016) = 110.16$$

$$P = \frac{110.16}{0.011016} = \underline{10000}$$

A ₹ 3000**B** ₹ 3,700**C** ₹ 10,000**D** ₹ 12,000

Q.45

The population of a town increases every year by 2% of the population at the beginning of that year. The number of years by which the total increase of population be 40% is

[June 2023]

CI
 $A = P + 40\% \text{ of } P = P + 0.4P = 1.4P$

$$\Rightarrow 1.4P = P \left(1 + \frac{2}{100}\right)^n$$

$$\Rightarrow 1.4 = (1.02)^n$$

$18 = n + 1$

$1.02^x = 1.4$

\downarrow
1.400

$$\frac{(1.02)^{17}}{1} = 1.4 = \frac{(1.02)^n}{1}$$

$n = 17$

- A** 15 years
- B** 17 years
- C** 19 years
- D** 20 years

Q.46

Govinda's mother decides to gift him ₹50,000 every year starting from today for the next five years. He deposits this amount in a bank as and when you receive and get 10% per annum interest rate compounded annually. What is the present value of this annuity?

Given $P(4, 0.10) = 3.16987$

↓
A.T.

↓
imm

[June 2023]

- A** ₹ 2,80,403.5
- B** ₹ 2,08,493.5 ✓
- C** ₹ 2,08,943.5
- D** ₹ 2,58,493.5

$$i = \frac{10}{100} = 0.1, \quad n-1 = 5-1 = 4$$

$$PV = 50000 + 50000 \left(\frac{(1+0.1)^4 - 1}{0.1(1.1)^4} \right) = 208493.5$$

3.16987

$$\left(\frac{(1+0.1)^4 - 1}{0.1(1.1)^4} \right)$$

$V(n, i)$

↓

Future Value $\rightarrow A(n, i) = A \left[\frac{(1+i)^n - 1}{i} \right]$

Present Value $\rightarrow P(n, i) = A \left[\frac{(1+i)^n - 1}{i(1+i)^n} \right]$

↓

$P(n, i)$

Q.47

Mrs. Paul invested ₹1,00,000 in a mutual fund scheme. She got a dividend of ₹10,000 for first year, ₹12,000 for second year, ₹16,000 for third year, ₹18,000 for fourth year and ₹21,000 for fifth year. What is Compounded Annual Growth Rate (CAGR) on dividend return?

[June 2023]

- A** 20.38%
- B** 18.59%
- C** 16.36%
- D** 15.89%

Year	Dividend
1	10000
2	12000
3	16000
4	18000
5	21000

$$\begin{aligned} \text{CAGR} &= \left(\frac{21000}{10000} \right)^{\frac{1}{5-1}} - 1 \times 100 \\ &= \left((2.1)^{\frac{1}{4}} - 1 \right) \times 100 \\ &= \left((2.1)^{\frac{1}{4}} - 1 \right) \times 100 = 20.38\% \end{aligned}$$

**Thank
You!**

