

Type-V

(To find Amount)

$$FV = \text{Amount } S = A \left[\frac{(1+i)^{n+1} - 1}{i} \right] \times 100m - 1$$

Calculator Trick (work as ordinary annuity)

Step-I Type $r \div 100$ $m + 1$ then push \times buttonStep-II Push = buttons $n + 1 - 1 = n$ times then push - 1 button then push + button then push r value then push \times 100m value buttons.Step-III Push - 1 button then \times button and then type A value & then push = button (we get the required result)

PAST EXAM QUESTIONS WITH SOLUTIONS (MEMORY BASED)

Q.1. Mr. X invests ₹ 10,000 every year starting from today for next 10 years suppose: interest rate is 8% per annum compounded annually. Calculate future value of the annuity:

(Given that $(1 + 0.08)^{10} = 2.15892500$)

- (a) ₹ 156454.88 (b) ₹ 144865.625
(c) ₹ 156554.88 (d) None of these.

[Nov. 2006]

Solution: (a) It is Annuity Due Question

$$A = FV = R \left[\frac{(1+i)^{n+1} - 1}{i} \right] \times 100m - 1$$

$$= 10,000 \left[\frac{(1+0.08)^{10+1} - 1}{0.08} \right] \times 100 - 1$$

$$= ₹ 1,56,454.88.$$

(a) is correct

Q.2. The present value of an annuity of ₹ 3,000 for 15 years at 4.5% p.a. C.I. is:

(Given that $(1.045)^{15} = 1.935282$)

- (a) ₹ 23,809.67 (b) ₹ 32,218.67
(c) ₹ 32,908.67 (d) None of these

[Nov. 2006]

$$\text{Solution: } PV = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$= 3000 \left[\frac{1 - (1.045)^{-15}}{0.045} \right]$$

Tricks = ₹ 32,218.67

Q.3. A machine can be purchased for ₹ 50,000. Machine will contribute ₹ 12,000 per year for the next five years. Assume borrowing cost is 10% per annum. Determine whether machine should be purchased or not:

- (a) Should be purchased
(b) Should not be purchased
(c) Can't say about purchase
(d) None of the above

[Feb. 2007]

$$\text{Solution: (b) } PV = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$PV = 12000 \left[\frac{1 - (1.10)^{-5}}{0.10} \right]$$

$$= ₹ 45,489.44$$

But it costs ₹ 50,000

∴ It should not be purchased

∴ (b) is correct

Q.4. How much amount is required to be invested every year so as to accumulate ₹ 3,00,000 at the end of 10 years, if interest is compounded annually at 10%?

[Give $(1.1)^{10} = 2.5937$]

- (a) ₹ 18,823.65 (b) ₹ 18,828.65
(c) ₹ 18,832.65 (d) ₹ 18,882.65

[Feb. 2007]

$$\text{Solution: (a) } FV = R \left[\frac{(1+i)^n - 1}{i} \right] \times 100m$$

$$3,00,000 = R \left[\frac{\left(1 + \frac{10}{100}\right)^{10} - 1}{0.10} \right] \times 100$$

$$R = \frac{3,00,000}{\left[\frac{(1.1)^{10} - 1}{0.10} \times 100\right]} = ₹ 18,823.65$$

(a) is correct

Q.5. A company is considering proposal of purchasing a machine either by making full payment of ₹ 4,000 or by leasing it for four years at an annual rate of ₹ 1,250. Which course of action is preferable, if the company can borrow money at 14%

compounded annually? [Given: $(1.14) = 1.68896$]

- (a) Leasing is preferable
(b) Should be purchased
(c) No difference
(d) None of these

[May 2007]

Solution: (a) ₹ 4000 = Present value

$$PV = R \left[\frac{1 - (1+i)^{-n}}{i} \right] \times 100m$$

$$= 1250 \left[\frac{1 - \left(1 + \frac{14}{100}\right)^{-4}}{0.14} \right] \times 100 = ₹ 3642.14$$

It is less than real cost price.

∴ Leasing is better

∴ (a) is correct

Q.6. Vipul purchases a car for ₹ 5,50,000. He gets a loan of ₹ 5,00,000 at 15% p.a. from a Bank and balance ₹ 50,000 he pays at the time of purchase. He has to pay the whole amount of loan in 12 equal monthly instalments with interest starting from the end of the first month. The money he has to pay at the end of every month is:

[Given $(1.0125)^{12} = 1.16075452$]

- (a) ₹ 45,130.43 (b) ₹ 45,230.43
(c) ₹ 45,330.43 (d) None of these

[May 2007]

Solution: Loan Value = ₹ 5,00,000 = PV

R = Instalment value = ?

$$PV = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

9.8

$$5,00,000 = R \left[\frac{1 - \left(1 + \frac{15}{1200}\right)^{-12}}{i} \right]$$

R = 45,130.43.

Q.7. A company establishes a sinking fund to provide for the payment of ₹ 2,00,000 debt maturing in 20 years. Contributions to the fund are to be made at the end of every year. Find the amount of each annual deposit if interest is 5% per annum :

- (a) ₹ 6,142 (b) ₹ 6,049
(c) ₹ 6,052 (d) 6,159

Solution : A = ₹ 200,000

$$200,000 = R \left[\frac{\left(1 + \frac{5}{100}\right)^{20} - 1}{5} \times 100 \right]$$

$$\text{or } R = \frac{2,00,000 \times 5}{\left[\left(1.05\right)^{20} - 1\right] \times 100}$$

= ₹ 6049 (Approx)

Q.8. Raja aged 40 wishes his wife Rani to have ₹ 40 lakhs at his death. If his expectation of life is another 30 years and he starts making equal annual investments commencing now at 3% compound interest p.a. How much should he invest annually?

- (a) ₹ 84,077 (b) ₹ 81,628
(c) ₹ 84,449 (d) ₹ 84

[Nov. 2007]

ANNUITY

Solution : (b) is correct.

R = value of instalment

$$= \frac{40,00,000}{\left[\frac{(1 + 0.03)^{30+1} - 1}{0.03} \right] - 1}$$

= ₹ 81,628.19

Calculator Trick

Type 1.03 × = button 30 times - 1 ÷ 0.03 - 1 = M + button (Press) Then type 40,00,000 ÷ MRC button = button we get answer.

Q.9. A company may obtain a machine either by leasing it for 5 years (useful life) at an annual rent of ₹ 2,000 or by purchasing the machine for ₹ 8,100. If the company can borrow money at 18% per annum, which alternative is preferable?

- (a) Leasing (b) Purchasing
(c) Can't say (d) None of these

[Feb. 2008]

Solution : (a) PV = ₹ 8100

It is ordinary Annuity

$$PV = 2000 \left[\frac{1 - \left(1 + \frac{18}{100}\right)^{-5}}{18} \times 100 \right]$$

= ₹ 6254.34

It is less than ₹ 8100.

∴ (a) is correct

Q.10. A sinking fund is created for redeeming debentures worth ₹ 5 lacs at the end of 25 years. How much

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9.9

provision needs to be made out of profits each year provided sinking fund investments can earn interest at 4% p.a.?

- (a) 12,006 (b) 12,040
(c) 12,039 (d) 12,035

[June 2008]

Solution : (a) is correct

Tricks : ₹ 5,00,000 = R $\left[\frac{(1.04)^{25} - 1}{0.04} \right]$

∴ R = 12006.00 approx

Q.11. Future value of an ordinary annuity :

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

(b) $A(n, i) = A \left[\frac{(1+i)^n + 1}{i} \right]$

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

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

[Dec. 2008]

Solution : (a) is correct.

It is Formulae.

Q.12. Paul borrows ₹ 20,000 on condition to repay it with compound interest at 5% p.a. in annual instalment of ₹ 2,000 each. Find the number of years in which the debt would be paid off.

- (a) 10 years (b) 12 years
(c) 14 years (d) 15 years

[June 2009]

Solution : (d) is correct

$$20,000 = 2000 \left[\frac{1 - \left(1 + \frac{5}{100}\right)^{-t}}{.5} \right] \times 100$$

or $10 = \left[\frac{1 - (1.05)^{-t}}{5} \right] \times 100$

or $\frac{10 \times 5}{100} = 1 - (1.05)^{-t}$

or $0.5 - 1 = (1.05)^{-t}$

or $0.5 - 1 = -(1.05)^{-t}$

or $(1.05)^t = \frac{1}{0.5} = 2$

or $t = \frac{\log 2}{\log(1.05)} = 15 \text{ yrs. approx.}$

Tricks : Go by choices

Q.13. Find the present value of an annuity of ₹ 1,000 payable at the end of each year for 10 years. If rate of interest is 6% compounding per annum.

(given $(1.06)^{-10} = 0.5584$):

- (a) ₹ 7,360 (b) ₹ 8,360
(c) ₹ 12,000 (d) None of these

[June 2010]

Solution : (a) is correct

$$PV = 1000 \left[\frac{1 - (1.06)^{-10}}{0.06} \right]$$

= ₹ 7360

(a) is correct.

9.10

Q.14. The future value of an annuity of ₹5,000 is made annually for 8 years at interest rate of 9% compounded annually

- [Given that $(1.09)^8 = 1.99256$]
- (a) ₹ 55,142.22 (b) ₹ 65,142.22
(c) ₹ 65,532.22 (d) ₹ 57,425.22

[Dec. 2010]

Solution : (a) is correct

$$FV = 5000 \left[\frac{(1.09)^8 - 1}{0.09} \right] = ₹ 55,142.22$$

∴ (a) is correct

Q.15. How much amount is required to be invested every year as to accumulate ₹6,00,000 at the end of 10th year, if interest is compounded annually at 10% rate of interest?

- (a) ₹ 37,467 (b) ₹ 37,476
(c) ₹ 37,647 (d) ₹ 37,674

[June 2014]

Solution : (c) is correct

Let amount invested annually = R

$$R = \frac{6,00,000}{\left[\frac{\left(1 + \frac{0.1}{100}\right)^{10} - 1}{10} \times 100 \right]}$$

$$= ₹ 37,647 \text{ (approx.)}$$

Q.16. The future value of an annuity of ₹1,000 made annually for 5 years at the rate of interest 14% compounded annually is

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- (a) ₹ 5610 (b) ₹ 6610
(c) ₹ 6160 (d) ₹ 5160

[Dec. 2014]

Solution : (b)

$$FV = 1000 \left[\frac{\left(1 + \frac{14}{100}\right)^5 - 1}{14} \times 100 \right]$$

$$= ₹ 6610.104 = ₹ 6610.$$

Q.17. Suppose your mom decides to gift you ₹10,000 every year starting from today for the next sixteen years. You deposit this amount in a bank as and when you receive and get 8.5% per annum interest rate compounded annually. What is the present value of this money: [Given that $P(15, 0.085) = 8.304236$]

- (a) 83,042 (b) 90,100
(c) 93,042 (d) 10,100

[Dec. 2015]

Solution : (c) is correct

$$PV = 10,000$$

$$\left[\frac{1 - \left(1 + \frac{8.5}{100}\right)^{-16}}{8.5} \times 100 + 1 \right]$$

$$= 10,000 (8.304236 + 1)$$

$$= ₹ 93,042$$

Q.18. The future value of an annuity of ₹1500 made annually for 5 years at an

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9.11

interest rate of 10% compounded annually is

[Given that $(1.1)^5 = 1.61051$]

- (a) 9517.56 (b) 9157.65
(c) 9715.56 (d) 9175.65

[June 2017]

Solution :

$$FV = 1500 \left[\frac{\left(1 + \frac{10}{100}\right)^5 - 1}{10} \times 100 \right]$$

Use Calculator tricks

$$= ₹ 9157.65$$

option (b) is correct.

Q.19. What sum should be invested at the end of every year so as to accumulate an amount of ₹ 796870 at the end of 10 years at the rate of interest 10% compounded annually, [given that $A(10; 0.1) = 15.9374$]

- (a) 40,000 (b) 4,50,000
(c) 4,80,000 (d) 50,000

[June 2017]

Solution : Calculator Tricks:

$$R = \frac{796870}{\left[\frac{\left(1 + \frac{10}{100}\right)^{10} - 1}{10} \times 100 \right]}$$

$$= ₹ 50,000$$

option (d) is correct.

Q.20. A person invests ₹2,000 at the end of each month @ of interest 6% compounding monthly, find the

amount of annuity after the 10th payment is :

- (a) ₹ 20,456 (b) ₹ 20,156
(c) ₹ 20,256 (d) ₹ 20,356

[June 2018]

Solution : (a)

$$FV = 2000 \left[\frac{\left(1 + \frac{6}{1200}\right)^{10} - 1}{6} \times 1200 \right]$$

$$= ₹ 20,456$$

Type 6 ÷ 1200 + 1 then press × button then = button 9 times - 1 ÷ 6 × 1200 × 2000 = button ; we will get the required result.

Q.21. Determine the present value of perpetuity of ₹ 50,000 per month @ Rate of interest 12% p.a. is

- (a) ₹ 45,00,000
(b) ₹ 50,00,000
(c) ₹ 55,00,000
(d) ₹ 60,00,000

[June 2019]

Solution : (b)

$$i = \frac{12}{1200} = 0.01$$

Formula

$$PV = \frac{R}{i} = \frac{50,000}{0.01}$$

$$= ₹ 50,00,000$$

(b) is correct.

Q.22. A person wants to lease out a machine costing ₹ 5,00,000 for a 10 year period. It has fixed a rental of

₹ 51,272 per annum payable annually starting from the end of first year. Suppose rate of interest is 10% per annum, compounded annually on which money can be invested. To whom this agreement is favourable?

- (a) Favour for lessee
- (b) Favour for lessor.
- (c) Not for both
- (d) Can't be determined

[June 2019]

Solution : (a)

Cost = ₹ 5,00,000.

So, GST = PV of Instalments made

$$= PV = 51,272 \left[\frac{1 - \left(1 + \frac{10}{100}\right)^{-10}}{i} \right]$$

Calculator Tricks

Type 10 ÷ 100 + 1 = button 10 times then press GT button then × 51,272 = button = ₹ 3,15,044.25. Which is less than ₹ 5,00,000.

So, Leasing is preferable.

(a) is correct.

Q.23. Let a person invest a fixed sum at the end of each month in an account paying interest 12% per year compounded monthly. If the future value of this annuity after the 12th payment is Rs. 55,000 then the amount invested every month is?

- (a) ₹ 4,837
- (b) ₹ 4,637
- (c) ₹ 4,337
- (d) ₹ 3337

[June 2019]

Solution : (c)

Calculator Tricks

Value of each instalments

$$= R = \frac{FV}{FV \text{ for } ₹ 1}$$

$$= \frac{55,000}{\left[\frac{\left(1 + \frac{12}{1200}\right)^{12} - 1}{12} \right] \times 1200}$$

= ₹ 4337

* Type 12 ÷ 1200 + 1 × = 11 times -1 ÷ 12 × 1200 = button.

Then press (+) button.

* Type 55000 ÷ button then press MRC button then = button.

We get ₹ 4337.

Q.24. Find the future value of annuity of ₹ 500 is made annually for 7 years interest rate of 14% compound at annually. Given that $(1.14)^7 = 2.5023$

- (a) ₹ 15635.35
- (b) ₹ 10,730.71
- (c) ₹ 16355.35
- (d) ₹ 16355.35

[Dec. 2019]

Solution : (b)

$$FV = 500 \left[\frac{\left(1 + \frac{14}{100}\right)^7 - 1}{7} \right] \times 100$$

$$= 500 \times \left[\frac{2.5023 - 1}{7} \right] \times 100$$

$$= ₹ 10,730.71$$

Q.25. Determine the present value of perpetuity ₹ 10 per month for infinite period at an effective rate of interest of 14% p.a.?

- (a) ₹ 657
- (b) ₹ 757
- (c) ₹ 857
- (d) ₹ 957

[Dec. 2020]

$$\text{Solution : } i = \left[\frac{14}{1200} \right]$$

$$\therefore PV = \left[\frac{R}{i} \right] = \frac{10}{\frac{14}{1200}} = \frac{10}{14} \times 1200$$

$$= ₹ 857.14 = ₹ 857.$$

(c) is correct.

Q.26. Which of the following statement is true?

- (a) F.V of ordinary annuity < F.V of annuity due
- (b) F.V of ordinary annuity > F.V of annuity due
- (c) P.V of ordinary annuity > P.V of annuity due
- (d) None of these

[Dec. 2020]

Solution : (a) is correct.

Q.27. Suppose you deposit ₹ 900 per month into an account that pays 14.8% interest compounded monthly. How

much money will you get after 9 months?

- (a) ₹ 8,511
- (b) ₹ 9,000
- (c) ₹ 9,200
- (d) ₹ 1,000

[Dec. 2020]

Solution :

$$FV = R \left[\frac{(1+i)^n - 1}{i} \right] \times 100m$$

$$= 900 = \left[\frac{\left(1 + \frac{14.8}{1200}\right)^9 - 1}{14.8} \right] \times 1200$$

$$= ₹ 8511.31 = ₹ 8511$$

Calculator Trick

14.8 ÷ 1200 + 1 × = button 8 times -1 ÷ 14.8 × 1200 × 900 = button. We get FV ₹ 8511.

(a) is correct.

Q.28. ₹ 2,500 is paid every year for 10 years to pay off a loan. What is the loan amount if interest rate be 14% per annum compounded annually?

- (a) 13,040.27
- (b) 15,847.90
- (c) 14,674.21
- (d) 16,345.11

[Dec. 2020]

Solution : Calculator Tricks

Loan amount

$$= PV = R \left[\frac{1 - (1+i)^{-n}}{i} \right]$$

$$= 2500 \left[\frac{1 - \left(1 + \frac{4}{100}\right)^{-10}}{i} \right]$$

Calculator Tricks

Type $14 \div 100 + 1 \div =$ button 10 times (Press)

Then press GT button, then \times button.

Type 2500 then $=$ button. (Press)

We get $PV = ₹ 13,040.28$

(a) is correct.

Q.29. Assuming that the discount rate is 7% p.a. how much would pay to receive ₹ 200 growing at 5% annually for ever?

(a) ₹ 2,500 (b) ₹ 5,000

(c) ₹ 7,500 (d) ₹ 10,000

[Jan. 2021]

Solution : (d) is correct

$$\text{Discount rate} = i = 7\% = \frac{7}{100} = 0.07$$

Growing rate = $g = 5\% = 0.05$

$R =$ Value of each payment received = ₹ 200

$$\therefore PVA = \frac{R}{i-g} = \frac{200}{0.07-0.05}$$

$$= ₹ 10,000$$

Q.30. ₹ 800 is invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the future value of this annually after 10th payment?

- (a) ₹ 4,444 (b) ₹ 8,756
(c) ₹ 3,491 (d) ₹ 8,182

[Jan. 2021]

Solution: (d) is correct.

Monthly Instalment = $A = ₹ 800$

rate of interest = $r = 6\%$ p.a. compounded monthly

$n =$ No. of Payments = 10

$$\therefore FV = A \cdot \frac{(1+r)^n - 1}{r} \times 100m$$

$$= 800 \left[\frac{\left(1 + \frac{6}{1200}\right)^{10} - 1}{6} \times 1200 \right]$$

$$= ₹ 8182$$

[Calculator Tricks $6 \div 1200 + 1 \times = 9$ times $-1 \div 6 \times 1200 \times 800 =$ button; we get ₹ 8182]

Q.31. The present value of an Annuity immediate is the same as

- (a) Annuity regular for $(n-1)$ year plus the initial receipt in the beginning of the period
(b) Annuity regular for $(n-1)$ years
(c) Annuity regular for $(n+1)$ years
(d) Annuity regular for $(n+1)$ years plus the initial receipt in the beginning of the period

[Jan. 2021]

Solution : (a) is correct

$$\therefore PV = R \left[\frac{1 - (1+i)^{-(n-1)}}{i} + 1 \right]$$

$$= R \left[\frac{1 - (1+i)^{-(n-1)}}{i} \right] + R$$

$=$ PV of Annuity Regular + Value of 1st instalment

(a) is correct.

Q.32. Find the future value of annuity of ₹ 1,000 made annually for 7 year at interest rate of 14% compounded annually (Given that $1.14^7 = 2.5023$)

(a) ₹ 10,730.7 (b) ₹ 5,365.35

(c) ₹ 8,756 (d) ₹ 9892.34

[Jan. 2021]

Solution : (a) is correct

$$FV = A \left[\frac{(1+i)^n - 1}{r} \times 100m \right]$$

Where $m =$ No. of conversion periods in 1 year = 1

$n =$ No. of payments made = mt

$= n = 1 \times 7 = 7$

$r = 14\%$ yearly

$A =$ Value of each instalment

$= ₹ 1000$

$FV = A_{(n,1)} = 1000$

$$\left[\frac{\left(1 + \frac{14}{100}\right)^7 - 1}{14} \times 100 \right]$$

Calculator Tricks

Type $14 \div 100 \times =$ button 6 times $-1 \div 14 \times 100 \times 1000 =$ button

We get 10,730.5 which is nearest to option (a) ₹ 10,730.7

\therefore (a) is correct

Q.33. A loan of ₹ 1,02,000 is to be paid back in two equal annual instalments. If the rate of interest is 4% p.a., compounded annually, then the total interest charged (in ₹) under this instalment plan is

(a) 6160 (b) 8120

(c) 5980 (d) 7560

[July 2021]

Solution : (a) is correct

Value of one Instalment

$$= \frac{PV}{\left[\frac{1 + (1+i)^{-(n-1)}}{i} + 1 \right]}$$

$$= \frac{1,02,000}{\left[\frac{1 - (1.04)^{-1}}{i} + 1 \right]}$$

Calculator Tricks

Type $1.04 \div = 1$ time press GT button + $1 =$ button then press $M +$ button

Then type 1,02,000 \div MRC button then $=$ button.

We get

$R = ₹ 52,000$

1st year, C.I. = ₹ 1,02,000 $\times 4\% = ₹ 4080$

2nd year, C.I. = ₹ 52,000 $\times 4\% = ₹ 2080$

Total compound Interest = ₹ 6160

\therefore (a) is correct

Q.34. If the nominal rate of growth is 17% and inflation is 9% for the five years. Let P be the Gross Domestic Product (GDP) amount at the present

year then the projected real GDP after 6 years is

- (a) 1.587 P
- (b) 1.921 P
- (c) 1.403 P
- (d) 2.51 P

[July 2021]

Solution : Real rate of return =
Nominal rate of return - Inflation =
17 - 9 = 8%

Expected Real GDP after 6 years

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

$$= 1.587 P$$

Where P = Gross Domestic Product (GDP) Amount

(a) is correct

Q.35. If a person bought a house by paying ₹ 45,00,000 down payment and

Q.36. Let the operating profit of a manufacturer for five years is given as:

Year	1	2	3	4	5	6
Operating profit (in lakh ₹)	90	100	106.4	107.14	120.24	157.35

Then the operating profit of Compound Annual Growth Rate (CAGR) for year 6 with respect to year 2 is given at

- (a) 9%
- (b) 12%
- (c) 11%
- (d) 13%

Solution : (b) is correct

Compound Annual Growth

Rate (CAGR) for year 6 with respect to year 2

$$= \left[\left(\frac{V_6}{V_2} \right)^{\frac{1}{6-2}} - 1 \right] \times 100\%$$

$$= \left[\left(\frac{157.35}{100} \right)^{\frac{1}{4}} - 1 \right] \times 100\%$$

₹ 80,000 at the end of each year till the perpetuity, assuming the rate of interest as 16%, the present value of house (in ₹) is given as

- (a) 47,00,000
- (b) 45,00,000
- (c) 57,80,000
- (d) 50,00,000

[July 2021]

Solution : (d) is correct
Present value of House

$$= 45,00,000 + \frac{R}{i}$$

$$= 45,00,000 + \frac{80000}{0.16}$$

Here $i = \frac{r}{100m} = \frac{16}{100 \times 1} = 0.16$

$$= 45,00,000 + 5,00,000$$

$$= 50,00,000$$

$$= \sqrt[4]{1.5735} - 1 \times 100\%$$

$$= 11.999\% = 12\%$$

Calculator Tricks

Type 1-5735 press $\sqrt{\text{button}}$ two times $-1 \times 100 = \text{button}$

We get 12%

Q.37. If discount rate is 14% per annum, then how much a company has to pay to receive ₹ 280 growing at 9% annually forever.

- (a) ₹ 5,600
- (b) ₹ 2,800
- (c) ₹ 1,400
- (d) ₹ 4,200

[July 2021]

Solution : (a) is correct

$$PVA = \frac{R}{i-g} = \frac{280}{0.14-0.09}$$

$$= ₹ 5600$$

Q.38. If the cost of capital be 12% per annum, then the net present value (in nearest ₹) from the given cash flow is given as :

Year	0	1	2	3
Operating profit (in thousands ₹)	(100)	60	40	50

- (a) 31048
- (b) 34185
- (c) 51048
- (d) 24187

Solution : (d) is correct

Year	Operating profit 1	PVIF @ 12% 2	Discounted Cash Flows = 1 ₹ 2
0	(100,000)	$\left(1 + \frac{12}{100} \right)^0 = 1$	(1,00,000)
1	60,000	$\left(1 + \frac{12}{100} \right)^{-1} = 0.893$	53,580
2	40,000	$\left(1 + \frac{12}{100} \right)^{-2} = 0.797$	31,880
3	50,000	0.712	35,600
Net present Value (NPA)			₹ 21,060

Its nearest value in option is (d)
So (d) is correct

Formula
 $PVIF = A(1+i)^{-n} = (1+i)^{-n}$
 When A = 1

Q.39. The future value of annuity of ₹ 2,000 for 5 years at 5% compounded annually is given (in nearest ₹) as

- (a) 51051
- (b) 21021
- (c) 15624
- (d) 61254

[July 2021]

Solution : (c) is correct

$$FV = R \left[\frac{(1+i)^n - 1}{i} \times 100m \right]$$

$$= 2000 \left[\frac{(1 + \frac{5}{100})^5 - 1}{5} \times 100 \right] = ₹ 11051.26$$

Calculator Tricks

Type 5 ÷ 100 + 1 × = 4 times -1
 ÷ 5 × 100 × 2000 = button
 We get ₹ 11,051.26

Which is nearest to smallest value in option (c)

Q.40. Mr. X wants to accumulate ₹ 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 $P(10,0,10) = 15.9374298$)

- (a) ₹ 3,13,726.87
- (b) ₹ 4,13,726.87
- (c) ₹ 3,53,726.87
- (d) ₹ 4,53,726.87

[Dec. 2021]

Solution : (a)

$$R = \frac{50,00,000}{\left[\frac{(1 + \frac{10}{100})^{10} - 1}{10} \right] \times 100}$$

[Calculator Tricks: Type 10 ÷ 100 + 1 × = button 9 Times - 1 ÷ 10 × 100 (M+) button (Press) Then type 50,00,000 ÷ button then MRC button = button]. We get the Ans.

$$= ₹ 3,13,726.87$$

Q.41. The present value of an annuity of ₹ 25,000 to be received after 10 years at 6% per annum compounded annually is ₹ _____ . ($1.06^{10} = 1.33823$)

- (a) ₹ 15,960
- (b) ₹ 13,960
- (c) ₹ 11,960
- (d) ₹ 17,960

[Dec. 2021]

Solution : (b)

Note : - Rectification : Delete word "an Annuity" from the question. Then Answer will match.

Formula

$$PV = A \left(1 + \frac{r}{100} \right)^{-n}$$

$$= 25,000 \left(1 + \frac{6}{100} \right)^{-10} = ₹ 13,960$$

On Calculator.

Type 6 ÷ 100 + 1 ÷ = button 10 times × 25,000 = button

$$\text{we get } 13,959.8 = ₹ 13,960.$$

Q.42. ₹ 800 is invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the future value of this annuity after 10th payment? Given that $1.005^{10} = 1.0511$

- (a) ₹ 4,444
- (b) ₹ 8,766
- (c) ₹ 3,491
- (d) ₹ 8,176

[June 2022]

Solution : Given that

$$R = ₹ 800 = \text{Value of one instalment}$$

$r = 6\%$ Compounded Monthly

$$n = 10$$

$$\therefore FV = R \left[\frac{(1+i)^n - 1}{i} \times 100m \right]$$

$$= 800 \left[\frac{\left(1 + \frac{6}{1200} \right)^{10} - 1}{6} \times 1200 \right]$$

$$= 800 \left[\frac{1.0511 - 1}{6} \times 1200 \right]$$

$$= ₹ 8176/-$$

(d) is correct

Q.43. Lokesh deposits ₹ 3,000 at the start of each quarter in his savings account. If the account earns interest 5.75% per annum compounded quarterly, how much money (in ₹) will he have at the end of 4 years? ($1.014375^{16} = 1.25696$)

- (a) ₹ 53,624.4
- (b) ₹ 58,353.6
- (c) ₹ 68,353.6
- (d) ₹ 63,624.4

[June 2022]

Solution : Given

$$R = ₹ 3000/- = \text{value of one instalment}$$

$r = 5.75\%$ compounded quarterly

$$t = 4 \text{ years}; n = mt = 4 \times 4 = 16$$

$$FV = 3000 \left[\frac{\left(1 + \frac{5.75}{400} \right)^{16} - 1}{5.75} \times 400 \right]$$

$$= 3000 \left[\frac{1.25696 - 1}{5.75} \times 400 \right]$$

$$= ₹ 53,626.43 \approx ₹ 53,624.40$$

(a) is correct

Q.44. Find the future value of annuity of ₹ 1,000 made annually for 7 years at interest rate 14% compounded annually. Given that $(1.14)^7 = 2.5023$

- (a) ₹ 10,730.71
- (b) ₹ 5,365.35
- (c) ₹ 8,756
- (d) ₹ 9,892.34

[June 2022]

$$\text{Solution : } FV = R \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= 1000 \left[\frac{\left(1 + \frac{14}{100} \right)^7 - 1}{14} \times 100 \right]$$

Where

$$R = ₹ 1000; i = \frac{14}{100}; n = mt = 1 \times 7 = 7$$

$$= 1000 \left[\frac{(2.5023 - 1)}{14} \times 100 \right]$$

$$= ₹ 10,730.71$$

∴ (a) is correct

Q.45. Assuming that the discount rate is 7% p.a. How much would you pay to receive ₹ 200. Growing at 5% annually forever?

- (a) ₹ 2,500
- (b) ₹ 5,000
- (c) ₹ 7,500
- (d) ₹ 10,000

[June 2022]

Solution : Given

R = ₹ 200; r = 7% yearly

∴ i = 0.07

g = 5%, = 0.05

∴ Present Value = $PV = \frac{R}{i-g}$

= $\frac{200}{0.07-0.05} = \frac{200}{0.02}$

= ₹ 10,000

∴ (d) is correct

Q.46. ₹ 2,500 is paid every year for 10 years to pay off a loan. What is the loan amount if interest rate be 14% p.a. compounded annually?

- (a) ₹ 15,847.90
- (b) ₹ 13,040.27
- (c) ₹ 14,674.21
- (d) ₹ 16,345.11

[June 2022]

Solution : Given that

Each instalment = R = ₹ 2500

time = 10 yrs

r = 14% compounded yearly

m = 1

∴ n = mt = 1 × 10 = 10

Loan = $PV = R \left[\frac{1-(1+i)^{-n}}{i} \right]$

= $2500 \left[\frac{1-\left(1+\frac{14}{100}\right)^{-10}}{i} \right]$

Calculator Tricks

Type 14 ÷ 100 + 1 ÷ = button 10 times then press GT button then × button

Type 2500 = button.

∴ Loan = ₹ 13,040.27

∴ (b) is correct

Q.47. Raj made an investment of ₹ 15,000 in a scheme and at the time of maturity the amount was ₹ 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

[June 2022]

Solution : Given

Vn = ₹ 25000

Vo = ₹ 15000

CAGR = r = 8.88%

Formula

$\left[\left(\frac{Vn}{Vo} \right)^{\frac{1}{n-0}} - 1 \right] \times 100 = \text{CAGR}$

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

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

or $\left(\frac{25000}{15000} \right)^{\frac{1}{n}} = 1 + 0.0888$

or $(1.0888)^n = \frac{25000}{15000} = 1.666\dots = 1.67$

GBC

@ n = 6

∴ (1.0888)⁶ ⇒ By calculator

1.0888 × 5 times

= 1.666605 = 1.67 Approx. (True)

∴ t = n = 6 (True)

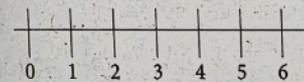
(a) is correct

Q.48. Madhu takes a loan of ₹ 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 ₹) of equal instalments, if Madhu wishes to repay the amount in five instalments.

- (a) ₹ 19,510
- (b) ₹ 19,430
- (c) ₹ 19,310
- (d) ₹ 19,630

[June 2022]

Solution :



R = Value of one instalment.

It is a Question of Deferred Annuity

1st Payment made at the end of 5 years.

So Deferred Period = m-1 = 5-1 = 4

No. of instalments = n = 5

$i = \frac{r}{100} = \frac{10}{100} = 0.10$

Loan = PV = ₹ 50,000

Formula

PV for Deferred Annuity

= $\frac{R [1-(1+i)^{-n}]}{i(1+i)^{m-1}}$

⇒ 50,000 = $R \frac{[1-(1+0.1)^{-5}]}{(0.10)(1+0.1)^4}$

= $R \left[\frac{1-(1.1)^{-5}}{0.1} \right] (1.1)^{-4}$

[On Calculator 1+ = Type 1.1 ÷ = button 5 times then press GT button then on + button

Then 1.1 ÷ = button 4 times × MRC button = button]

∴ 50,000 = R [2.589158]

∴ R = $\frac{50,000}{2.589158}$

= ₹ 19311/-

∴ (c) is correct.

Q.49. Ramesh invests ₹ 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? (1.09¹⁰ = 2.36736)

- (a) ₹ 3,88,764.968
- (b) ₹ 3,03,858.594

(c) ₹ 2,68,728.484

(d) ₹ 4,08,718.364

[June 2022]

Solution : Given

R = Volume of one instalment = ₹ 20,000/-

r = 9% yrly ; t = 10 yrs

n = 1 × 10 = 10

$$\therefore \text{FV} = 20,000 \left[\frac{\left(1 + \frac{9}{100}\right)^{10} - 1}{0.09} \right]$$

$$= 20000 \left[\frac{(1.09)^{10} - 1}{0.09} \right]$$

$$= 20000 \left[\frac{2.36736 - 1}{0.09} \right]$$

$$= 3,03,857.77$$

$$\approx 3,03,858.594 \text{ (approx.)}$$

∴ (b) is correct

Q.50. A company creates a sinking fund of ₹ 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: $1.06^{14} = 2.209$)

(a) ₹ 8,945 (b) ₹ 8,145

(c) ₹ 9,345 (d) ₹ 9,645

[Dec. 2022]

Solution : Given that

FV = ₹ 2,00,000

T = 15 yrs; r = 6% yearly

n = mt = 1 × 15 = 15

∴ Value of one instalment

$$= R = \frac{\text{FV}}{\frac{(1+i)^n - 1}{r} \times 100 \text{ m}}$$

$$= \frac{2,00,000}{\frac{\left(1 + \frac{6}{100}\right)^{15} - 1}{6} \times 100}$$

$$= \frac{2,00,000}{(1.06)^{14} (1.06) - 1} \times 100$$

[Note:- We have to use given value $(1.06)^{14} = 2.209$]

$$= \frac{200,000}{(2.209 \times 1.06 - 1)} \times 100$$

$$= ₹ 8944.94 = ₹ 8945/-$$

∴ (a) is correct

Q.51. How much amount is required to be invested every year so as to accumulate ₹ 5,00,000 at the end of 12 years if interest is compounded annually at 10%? (Where $A(12, 0.1) = 21.384284$).

(a) ₹ 23381.65 (b) ₹ 24385.85

(c) ₹ 26381.65 (d) ₹ 28362.75

[Dec. 2022]

Solution: FV = ₹ 5,00,000

R. $A(n, i) = \text{FV}$

Where

R = value of 1 instalment (yearly)

∴ R. $A(12, 0.10) = 5,00,000$

$$\text{or } R = \frac{5,00,000}{A(12, 0.10)}$$

$$= \frac{5,00,000}{21.38165}$$

$$= ₹ 23,381.65$$

∴ (a) is correct.

Q.52. Raju invests ₹ 20,000 every year in a deposit scheme starting from today for next 12 years. Assuming that interest rate on this deposit is 7% per annum compounded annually. What will be the future value of this annuity? Given that $(1 + 0.07)^{12} = 2.25219159$.

(a) ₹ 5,40,526 (b) ₹ 3,82,813

(c) ₹ 6,43,483 (d) ₹ 3,57,769

[Dec. 2022]

Solution: Given :

Value of 1 instalment = R = ₹ 20,000 (yearly)

Starting from today means annuity due

r = 7% compounded yearly; t = 12 yrs

$$\text{FV} = (1+i) \times R \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= \left(1 + \frac{7}{100}\right) \times 20,000 \left[\frac{\left(1 + \frac{7}{100}\right)^{12} - 1}{7} \times 100 \right]$$

$$= (1.07) \times 20,000 \left[\frac{2.25219159 - 1}{7} \times 100 \right]$$

$$= ₹ 3,82,813$$

∴ (b) is correct

Q.53. Mr. A invested ₹ 10,000 every year for next 3 year at the interest rate of 8 per cent per annum compounded

annually. What is future value of the annuity?

(a) 32,644 (b) 32,464

(c) 34,4264 (d) 36,442

[Dec. 2022]

Solution: Given :

Value of 1 instalment = R = ₹ 10,000

Time = t = 3 years

r = 8% p.a. compounded yearly

∴ m = 1

n = mt = 3 × 1 = 3

FV = ?

$$\text{FV} = R \left[\frac{(1+i)^n - 1}{r} \times 100 \text{ m} \right]$$

$$= 10,000 \left[\frac{\left(1 + \frac{8}{100}\right)^3 - 1}{8} \times 100 \right]$$

$$= ₹ 32,464$$

∴ (b) is correct

Q.54. ₹ 5,000 is invested every month end 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 $(1.01)^{11} = 1.1156$)

(a) ₹ 57,800 (b) ₹ 56,100

(c) ₹ 56,800 (d) ₹ 57,100

[Dec. 2022]

Solution: Given

R = ₹ 5000;

r = 12% p.a. compounded monthly

n = 11 (ordinary Annuity)

- (c) ₹ 2,68,728.484
(d) ₹ 4,08,718.364

[June 2022]

Solution : Given

R = Value of one instalment = ₹ 20,000/-

r = 9% yrly ; t = 10 yrs

n = 1 × 10 = 10

$$\therefore \text{FV} = 20,000 \left[\frac{\left(1 + \frac{9}{100}\right)^{10} - 1}{0.09} \right]$$

$$= 20000 \left[\frac{(1.09)^{10} - 1}{0.09} \right]$$

$$= 20000 \left[\frac{2.36736 - 1}{0.09} \right]$$

$$= 3,03,857.77$$

$$\approx 3,03,858.594 \text{ (approx.)}$$

\(\therefore\) (b) is correct

Q.50. A company creates a sinking fund of ₹ 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 \leftrightarrow (if need, use: $1.06^{15} = 2.209$)

(a) ₹ 8,945 (b) ₹ 8,145

(c) ₹ 9,345 (d) ₹ 9,645

[Dec. 2022]

Solution : Given that

$$\text{FV} = ₹ 2,00,000$$

T = 15 yrs; r = 6% yearly

$$n = mt = 1 \times 15 = 15$$

\(\therefore\) Value of one instalment

$$= R = \frac{\text{FV}}{\left[\frac{(1+i)^n - 1}{r} \times 100 \right]}$$

$$= \frac{2,00,000}{\left[\frac{\left(1 + \frac{6}{100}\right)^{15} - 1}{6} \times 100 \right]}$$

$$= \frac{2,00,000}{\left[\frac{(1.06)^{15} - 1}{6} \times 100 \right]}$$

[Note:- We have to use given value $(1.06)^{15} = 2.209$]

$$(1.06)^{15} = 2.209$$

$$= \frac{200,000}{\left[\frac{(2.209 \times 1.06 - 1)}{6} \right]} \times 100$$

$$= ₹ 8944.94 = ₹ 8945/-$$

\(\therefore\) (a) is correct

Q.51. How much amount is required to be invested every year so as to accumulate ₹ 5,00,000 at the end of 12 years if interest is compounded annually at 10%? (Where $A(12, 0.1) = 21.384284$).

(a) ₹ 23381.65 (b) ₹ 24385.85

(c) ₹ 26381.65 (d) ₹ 28362.75

[Dec. 2022]

Solution: $\text{FV} = ₹ 5,00,000$

R. $A(n, i) = \text{FV}$

Where

R = value of 1 instalment (yearly)

$$\therefore R \cdot A(12, 0.10) = 5,00,000$$

$$\text{or } R = \frac{5,00,000}{A(12, 0.10)}$$

$$= \frac{5,00,000}{21.38165}$$

$$= ₹ 23,381.65$$

\(\therefore\) (a) is correct.

Q.52. Raju invests ₹ 20,000 every year in a deposit scheme starting from today for next 12 years. Assuming that interest rate on this deposit is 7% per annum compounded annually. What will be the future value of this annuity? Given that $(1 + 0.07)^{12} = 2.25219159$.

(a) ₹ 5,40,526 (b) ₹ 3,82,813

(c) ₹ 6,43,483 (d) ₹ 3,57,769

[Dec. 2022]

Solution: Given :

Value of 1 instalment = R = ₹ 20,000 (yearly)

Starting from today means annuity due $r = 7\%$ compounded yearly; $t = 12$ yrs

$$\text{FV} = (1+i) \times R \left[\frac{(1+i)^n - 1}{i} \right]$$

$$= \left(1 + \frac{7}{100}\right) \times 20,000 \left[\frac{\left(1 + \frac{7}{100}\right)^{12} - 1}{7} \times 100 \right]$$

$$= (1.07) \times 20,000 \left[\frac{2.25219159 - 1}{7} \times 100 \right]$$

$$= ₹ 3,82,813$$

\(\therefore\) (b) is correct

Q.53. Mr. A invested ₹ 10,000 every year for next 3 year at the interest rate of 8 per cent per annum compounded

annually. What is future value of the annuity?

(a) 32,644 (b) 32,464

(c) 34,4264 (d) 36,442

[Dec. 2022]

Solution: Given :

Value of 1 instalment = R = ₹ 10,000

Time = $t = 3$ years

$r = 8\%$ p.a. compounded yearly

\(\therefore\) $m = 1$

$$n = mt = 3 \times 1 = 3$$

FV = ?

$$\text{FV} = R \left[\frac{(1+i)^n - 1}{r} \times 100 \right]$$

$$= 10,000 \left[\frac{\left(1 + \frac{8}{100}\right)^3 - 1}{8} \times 100 \right]$$

$$= ₹ 32,464$$

\(\therefore\) (b) is correct

Q.54. ₹ 5,000 is invested every month end 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 $(1.01)^{12} = 1.1156$)

(a) ₹ 57,800 (b) ₹ 56,100

(c) ₹ 56,800 (d) ₹ 57,100

[Dec. 2022]

Solution: Given

R = ₹ 5000;

$r = 12\%$ p.a. compounded monthly

$n = 11$ (ordinary Annuity)

$$\therefore FV = R \left[\frac{(1+i)^n - 1}{i} \times 100m \right]$$

$$= 5000 \left[\frac{\left(1 + \frac{12}{1200}\right)^{11} - 1}{12} \times 1200 \right]$$

$$= 5000 \left[\frac{1.1156 - 1}{12} \times 1200 \right]$$

$$= ₹ 57,800$$

(a) is correct

Q.55. Sinking fund factor is the reciprocal of :

- Present value interest factor of a single cash flow
- Present value interest factor of an annuity
- Future value interest factor of an annuity
- Future value interest factor of a single cash flow

[Dec. 2022]

Solution: (c) $FV = A.A(n; i) = A =$

$$\frac{Fv}{A(n; i)}$$

Where A = Value of one instalment

$A(n; i)$ = Annuity factor

(a) is correct

Q.56. 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 where you get return at the rate of 10% per annum compounded annually. What is the future value of this annuity? Given $1.1^{10} = 2.59374$

$$(a) ₹ 17,35,114$$

$$(b) ₹ 17,53,411$$

$$(c) ₹ 17,35,411$$

$$(d) ₹ 17,53,114$$

[June 2023]

Solution: Given

$R = ₹ 1,00,000/-$ Today \Rightarrow Annuity Due

$r = 10\%$ pa. yearly; $n = 10$

$$FV = (1+i) \times A \left[\frac{(1+i)^n - 1}{i} \right]$$

$$\left(1 + \frac{10}{100}\right) \times 1,00,000 \left[\frac{\left(1 + \frac{10}{100}\right)^{10} - 1}{0.10} \right]$$

$$= (1.10) \times (1,00,000) \times \left[\frac{2.59374 - 1}{0.10} \right]$$

$$= ₹ 17,53,114$$

(a) is correct.

Q.57. Ms. Paul invested ₹ 1,00,000 in a mutual fund scheme in January 2018. After one year in January, 2019, she got a dividend amounting to ₹ 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 in January 2023. What is Compounded Annual Growth Rate (CAGR) of dividend return? Given $1.2038^4 = 2.1$.

$$(a) 20.38\%$$

$$(b) 18.59\%$$

$$(c) 16.36\%$$

$$(d) 15.89\%$$

[June 2023]

Solution: Given

Investment = ₹ 1,00,000/- (in 2018)

Years	2019	2020	2021	2022	2023
	10,000	12,000	16,000	18,000	21,000

Formula

$$CAGR = \left[\left(\frac{V_n}{V_0} \right)^{\frac{1}{n-t_0}} - 1 \right] \times 100$$

$$= \left[\left(\frac{21,000}{10,000} \right)^{\frac{1}{2023-2019}} - 1 \right] \times 100$$

$$= \left[(2.1)^{\frac{1}{4}} - 1 \right] \times 100$$

$$\left[\because (1.2038)^4 = 2.1 \right]$$

$$\therefore (2.1)^{\frac{1}{4}} = 1.2038$$

$$= [1.2038 - 1] \times 100 = 20.38\%$$

\therefore (a) is correct.

Q.58. A company want to replace its existing tool room machine at the end of 10 years, the expected cost of machine would be ₹ 10,00,000. If management of the company creates a sinking fund, how much provision needs to be made out of revenue each year which can earn at the rate of 10% compounded annually? Given $A(10,0.10) = 15.937425$

$$(a) ₹ 74,625$$

$$(b) ₹ 72,514$$

$$(c) ₹ 62,745$$

$$(d) ₹ 67,245$$

[June 2023]

Solution: Value of 1st instalment

$$= \frac{FV}{A(n; i)} = \frac{10,00,000}{A(10; 0.10)}$$

$$\frac{10,00,000}{15.937425} = ₹ 62,745.39$$

$$= ₹ 62,745$$

(c) is correct.

Q.59. 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 $P(3,0.14) = 2.32163$):

- (a) ₹ 1,46,314
 (b) ₹ 1,46,137
 (c) ₹ 1,28,040
 (d) ₹ 1,58,040

[June 2023]

Solution:

Cost of Car	= ₹ 4,98,200
Cash Down	= ₹ 60,000
Rest Amount for	= ₹ 4,38,200
	= PV

instalments

Value of each Instalment

$$\begin{aligned} &= \frac{PV}{PV \text{ for } ₹ 1} \\ &= \frac{4,38,200}{P(3,0.14)} \\ &= \frac{4,38,200}{2.32163} = ₹ 188,746.65 \end{aligned}$$

Total Value of 3 Instalments

$$= 188,746.65 \times 3$$

$$= ₹ 5,66,240.$$

$$\text{Total Interest} = 5,66,240 - 4,38,200$$

$$= ₹ 1,28,040$$

(c) is correct.

Q.60. Govinda's mother decides to gift him ₹ 50,000 every year starting from today for the next five years. Govinda deposits this amount in a bank as and when he receives and gets 10% per annum interest rate, compounded annually. What is the present value of

this annuity? Given $P(4,0.10) = 3.16987$.

- (a) ₹ 2,80,493.5
 (b) ₹ 2,08,493.5
 (c) ₹ 2,08,943.5
 (d) ₹ 2,58,493.5

[June 2023]

Solution: Given

Value of one instalment

$$= R = ₹ 50,000/- \text{ yearly}$$

$$t = 5 \text{ years; } r = 10\% \text{ yearly}$$

$$n = 5 \times 1 = 5$$

(Annuity Due Qts.)

$$PV = R \left[\frac{1 - (1+i)^{-(n-1)}}{i} + 1 \right]$$

$$= 50,000 \left[\frac{1 - \left(1 + \frac{10}{100}\right)^{-(5-1)}}{i} + 1 \right]$$

$$= 50,000 [P(4, 0.10) + 1]$$

$$= 50,000 [3.16987 + 1]$$

$$= 2,08,493.5$$

∴ (b) is correct.

Q.61. If the discount rate is 10% per annum, how much amount would you pay to receive ₹ 2,500 growing at 8%, annually forever?

- (a) ₹ 1,25,000
 (b) ₹ 2,50,000
 (c) ₹ 1,50,000
 (d) ₹ 2,00,000

[June 2023]

Solution:

Given

$$R = ₹ 2,500/-$$

$$PVA = \frac{R}{i-g} = \frac{2500}{\frac{10}{100} - \frac{8}{100}}$$

$$= \frac{2500}{\frac{2}{100}} = 2500 \times \frac{100}{2}$$

$$= ₹ 1,25,000$$

∴ (a) is correct.

Q.62. 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?

- (a) ₹ 39,500
 (b) ₹ 38,500
 (c) ₹ 37,500
 (d) ₹ 36,600

[June 2023]

Solution:

$$\text{Given PVA} = ₹ 50,00,000$$

$$\text{Value of 1st instalment} = R \text{ (let)}$$

$$i = 9\% \text{ monthly,}$$

$$\therefore PVA = \frac{R}{i} \Rightarrow R = PVA \times i$$

$$\therefore R = 50,00,000 \times \frac{9}{1200}$$

$$= ₹ 37,500$$

∴ (c) is correct.

Tricks

$$\begin{aligned} P \cup A &= R \div (r-g)\% \text{ button} \\ &= 2500 \div 2\% \text{ button} \\ &= ₹ 1,25,000 \end{aligned}$$

Q.63. Jonny wants to have ₹ 2,00,000 in his saving account after three year. The rate of interest offered by bank is 8% per annum compounded annually. How much should he invest today to achieve his target amount?

- (a) ₹ 1,47,489.10
 (b) ₹ 1,58,766.44
 (c) ₹ 1,71,035.59
 (d) ₹ 1,84,417.96

[June 2023]

Solution: Given

$$FV = ₹ 2,00,000$$

$$r = 8\% \text{ yearly; } t = 3 \text{ yrs; } n = 3$$

Annuity Due Qts.;

$$\text{Value of one instalment} = R = ?$$

$$R = \frac{FV}{\frac{(1+i)^{n+1} - 1}{i}}$$

$$= \frac{2,00,000}{\frac{(1 + \frac{8}{100})^{3+1} - 1}{0.08}}$$

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ANNUITY

$$= \frac{2,00,000}{\left[\frac{(1.80)^4 - 1}{0.08} - 1 \right]} = ₹ 57043.24$$

Calculator Tricks

Type 1.08 x = button 3 times - 1

÷ 0.08 - 1 = button then press (M⁺)
button. After thisType 2,00,000 ÷ MRC button 2 times
(press) then press = button. We get R
ValueNow 1st investment value

$$= PV = 57043.24 \left[\frac{1 - \left(1 + \frac{8}{100}\right)^{-(3-1)}}{0.08} + 1 \right]$$

$$= ₹ 1,58,766.44 \text{ approx.}$$

∴ (b) is correct.