Chapter 2

TIME VALUE OF MONEY

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1. **Amount = Principle + Interest**
   Principle = Amount - Interest
   Interest = Amount - Principle

2. **Why is interest paid?** (in a commercial transaction)
   1. Time Value of Money
   2. Opportunity Cost
   3. Inflation
   4. Liquidity Preference
   5. Risk Factor

3. **Simple Interest =** $P \cdot n \cdot r$

   Amount = P + Simple Interest

   $= P + Pnr = P(1+nr)$

4. **Compound Interest =** $P[(1+r)^n] - P = P[(1+r)^n - 1]$

   Amount = $P[(1+r)^n]$

5. **With Simple Interest**

Amount Invested	Amount at the end of years						
	5 = R	10 = 2R	15 = 3R	20 = 4R	25 = 5R	30 = 6R	35 = 7R
P	2P	3P	4P	5P	6P	7P	8P
P	3P	5P	7P	9P	11P	13P	15P

6. **With Compound Interest**

Amount Invested	Amount at the end of years					
	7	14	21	28	35	42
P	2P	4P	8P	16P	32P	64P
P	3P	9P	27P	81P	243P	729P
P	4P	16P	64P	256P	1024P	4096P

7. **A = 50,00,000; r = 12% p.a.S.I; P = ?; n = 10 years**

   → $A = P(1+nr)$

   $50,00,000 = P \times (1 + 10 \times 0.12)$

   $50,00,000 = P \times 2.20$

   $P = 22,72,727$

8. A = 50,50,000; r = 13.50% p.a.S.I; P = 20,00,000 ; n = ____ years

$A = P(1+nr)$

$50,50,000 = 20,00,000\ [1 + n \times 0.1350]$

$n = 11.2963$ years

9. A = ?; r = 18% p.a.S.I; P = 25,000 ; n = 8 years 3 months

$A = P(1+nr)$

$= 25,000\ [1+(8.25 \times 0.18)]$

$= ₹62,125/-$

10. A sum of money doubles itself with compound interest in 10 years. How many times it will become after 40 years?

sum invested	After			
	10Y	20Y	30Y	40Y
P	2P	4P	8P	16P

11. Find the future value of ₹ 50,000 after 25 years @ 22% p.a.C.I

$A = P(1+r)^n$

Future value = present value $\times (1+r)^n$

$= 50,000 \times (1.22)^{25} = ₹72,10,506/-$

12. Find present value of ₹ 20,00,000 receivable after 25 years if money is 18.50% effective.

present value = Future value x Discounting Factor

$= 20,00,000 \times 0.014356257753 = 28,713/-$

How to find Discounting factor on calculator for nth year?

$\Rightarrow 1 \div (1+r)$ then press = till step count comes (n+2)

13. A = ?; r = 14% p.a.C.Q; P = 20,00,000 ; n = 3 years 9 months

$3 \times 4 + 3$

$A = P(1+r)^n$

$= 20,00,000 \left[1 + \frac{0.14}{4}\right]^{15}$

$= 20,00,000 \times (1.035)^{15} = ₹\ 33,50,698/-$

14. A = 80,00,000; r = 18.50% p.a.C.semiannually; P = ? ; n = 8 years 6 months

8.50×2

$A = P(1+r)^n$

$80,00,000 = P\left(1 + \frac{0.1850}{2}\right)^{17}$

$80,00,000 = P \times (1.0925)^{17} \quad \therefore P = ₹\ 17,77,974/-$

15.

Compounded	No. of conversion periods in a year
Annually	1
Semi-annually	2
Monthly	12
Quarterly	4
Weekly	52
Daily	365
Fortnightly	24

16. P = 20,000; r = 20% p.q.c.w; n = 3 months; A = ?

$0.25 \text{ years} \times 52$

$A = P(1+r)^n$

$= 20,000\left(1 + \frac{0.20}{52}\right)^{13}$

$= 20,000 \times (1.003846153 84)$

$= ₹\ 21,023/-$

17. A = 2,00,000; r = 18% p.a.C.Q; P = 80,000 ; n = _____ years

$A = P(1+r)^n$

$2,00,000 = 80,000\left(1+\frac{0.18}{4}\right)^{4n}$

$2.50 = (1.045)^{4n}$

$\text{Log } 2.50 = 4n \times \text{Log } 1.045$

$4n = \frac{\text{Log } 2.50}{\text{Log } 1.045}$

$4n = \frac{0.3979454131 8}{0.0191161686 5} = 5.20 \text{ years}$

18. A = 20,00,000; r = _____% p.a.C.Q ; P = 5,00,000 ; n = 8 years

$A = P(1+r)^n$

$20,00,000 = 5,00,000\left(1+\frac{r}{4}\right)^{8\times4}$

$4 = \left(1+\frac{r}{4}\right)^{32}$

$\therefore 1+\frac{r}{4} = 4^{1/32}$

$r = 17.7095129 68\%$ p.a.C.Q.

19. 1.01^{35} = 1.4166027 5588

1.1025^{38} = 40.774320 2164

1.10285^{45} = 81.89 17 47 4745

1.1826^{90} = 3592598.79256

20. A = P (1+r)^n

A = Amount = principle + CI = sum invested + comp. interest

P = principle amt = sum invested

r = Rate of interest of conversion period

n = No. of conversion periods

21. Discounting Factor = $1 \div (1+r)^n$

Present Value = (Future Value x Discounting Factor)

How to find discounting factor on calculator? (For nth year)

$\Rightarrow \frac{1}{(1+r)^n} \Rightarrow 1 \div (1+r)$ then press till step count comes 'n+2'

22. **Simple Annuity is a series of payment / receipts where**

- Time Gap betⁿ 2 consecutive payments / receipts must be same.
- Amount paid / received in every period must be same.

23. **Effective rate of interest** $= \left(1 + \frac{r}{n}\right)^{n} - 1$ where r = Nominal rate of interest
n = No. of conversion periods in a year

Find eff. rate for 20% p.a. c. semi annually ?

$\Rightarrow \left(1 + \frac{0.20}{2}\right)^{2} - 1 = 1.10^{2} - 1 = 0.21 = 21\%$ p.a.c.a.

24.

Nominal Rate of Interest	Effective Rate of Interest
12% p.a.c.q	$\left(1 + \frac{0.12}{4}\right)^{4} - 1 = 1.03^{4} - 1 = 12.550881\%$
14.50% p.a.c.m	$\left(1 + \frac{0.1450}{12}\right)^{12} - 1 = 1.012083333^{12} - 1 = 15.503535269\%$
18% p.a.c.semiannually	$\left(1 + \frac{0.18}{2}\right)^{2} - 1 = 1.09^{2} - 1 = 18.81\%$
26.26% p.a.c.weekly	$\left(1 + \frac{0.2626}{52}\right)^{52} - 1 = 1.00505^{52} - 1 = 29.94475\%$
22% p.a.c.monthly	$\left(1 + \frac{0.22}{12}\right)^{12} - 1 = 1.018333333^{12} - 1 = 24.359657782\%$

25.

Effective Rate of Interest	Nominal Rate of Interest
18%	16.898654 18 % p.a.c.q
20%	18.37 % p.a.c.monthly
28.56%	26.768604528 % p.a.c. half yearly

① $0.18 = \left(1 + \frac{r}{4}\right)^{4} - 1 \quad \therefore \left(1 + \frac{r}{4}\right)^{4} = 1.18 \quad 1 + \frac{r}{4} = 1.18^{1/4}$

$r = 16.898654 18\%$

② $0.20 = \left(1 + \frac{r}{12}\right)^{12} - 1$ ③ 35 $0.2856 = \left(1 + \frac{r}{2}\right)^{2} - 1$

26. 18.50% p.a.c.monthly is equivalent to ____r____ % p.a.c.q

$$\left(1+\frac{0.1850}{12}\right)^{12}-1=\left(1+\frac{r}{4}\right)^{4}-1$$

$$1.0154166666^{12}=\left(1+\frac{r}{4}\right)^{4}$$

$$1.0154166666^{3}=1+r/4 \qquad r=18.7867\ \%\ \text{p.a.c.q.}$$

27. I) 20.86% p.a.c.q is equivalent to ____r____ % p.a.c. half yearly.

$$\left(1+\frac{0.2086}{4}\right)^{4}-1=\left(1+\frac{r}{2}\right)^{2}-1$$

$$1.05215^{4}=\left(1+\frac{r}{2}\right)^{2}$$

$$r=21.40392455\ \%\ \text{p.a.c. half yearly}$$

II) 18.24% p.a.c.q is equivalent to m % p.a.c.m Find m.

$$\left(1+\frac{0.1824}{4}\right)^{4}=\left(1+\frac{m}{12}\right)^{12}$$

$$1.0456^{4}=\left(1+\frac{m}{12}\right)^{12}$$

$$1+\frac{m}{12}=(1.195259759)^{1/12}$$

$$m=17.96989488\ \%$$

28. a. Future Value of annuity regular =

$$=\text{Periodical amount}\times\left[\frac{(1+r)^{n}-1}{r}\right]$$

b. Future Value of annuity due =

$$\text{Periodical amount}\times\left[\frac{(1+r)^{n}-1}{r}\right]\times(1+r)$$

29. Annuity Regular (or ordinary annuity) — Payment/Receipt is at the end of every period

Annuity Due / Immediate — Payment/Receipt is at the start of every period

30. Present Value of Annuity Regular = (Periodical Amount x Annuity Factor)

31. Present Value of Annuity Due = (Periodical Amount x Annuity Factor) x (1+r)

How to find annuity factor on calculator : $1 \div (1+r)$ then = till step count comes $(n+2)$ then press GT

32. Mr. A invested ₹ 500 at the end of each year for 30 years. Find amount to be received at the end of 30 years, if money is 16% effective.

→ (Future value of annuity regular) = periodical amt $\times \frac{(1+r)^n - 1}{r}$

$= ₹500 \times \left(\frac{1.16^{30} - 1}{0.16}\right) = ₹2,65,156/-$

33. A loan of ₹ 8,00,000 is to be repaid in 10 annual installments. Find amount of installment if interest rate is 12% p.a.

→ present value of annuity = P.A. x Annuity factor

$8,00,000 = \text{Installment amt} \times 5.650223028 25$

Installment amt = ₹ 1,41,587/-

34. A person desires to create a sinking fund to be invested @12% p.a.c.l. by saving some amount at the end of each year for 30 years to buy house worth ₹ 30,00,000. Find amount to be saved at the end of each year.

→ Future value of annuity regu. $= P.A. \times \frac{(1+r)^n - 1}{r}$

$30,00,000 = P.A. \times \left(\frac{1.12^{30} - 1}{0.12}\right)$

P.A. = ₹ 12,431

35. Rahul invested ₹ 70,000 in a bank at the rate of 6.50% p.a.S.I. he received ₹ 85,925 at the end of term. Find out the period for which the sum was invested by Rahul.

→ A = 85925, P = 70,000, r = 6.50% P.a.S.I.

n = ?

$A = P(1+nr)$

$85925 = 70,000 [1 + n \times 0.0650]$

n = 3.50 years

36. Kapil deposited some amount in a bank for $7\frac{1}{2}$ years @ 6%p.a.S.I. Kapil received ₹ 1,01,500 at the end of term. Compute initial deposit of Kapil.

→ $A = 1,01,500$, $r = 6\%$ p.a.S.I., $n = 7.50$ years, $P = ?$

$A = P(1+nr)$

$1,01,500 = P[1 + (7.50 \times 0.06)]$

$P = 70,000/-$

37. A sum of ₹ 46,875 was lent out at simple interest and at the end of 1 year and 8 months the total amount was ₹ 50,000. Find rate of interest p.a.

→ $P = 46,875$, $A = 50,000$, $n = 1.6666666$ years

$r = \_\_\_\_\%$ p.a.S.I.

$A = P(1+nr)$

$50,000 = 46,875[1 + 1.6666666r]$ $\quad r = 4\%$ p.a.S.I.

38. What sum of money will produce ₹ 28,600 as an interest in 3 years and 3 months @2.50% p.a.S.I.

→ $P = ?$ $SI = 28,600$, $n = 3.25$ years, $r = 2.50\%$ p.a.S.I.

$SI = P \cdot n \cdot r$

$28600 = P \times 3.25 \times 0.0250$

$P = ₹ 3,52,000/-$

39. The sum required to earn monthly interest of ₹ 1,200 at 18% p.a.S.I is :

→ SI for 1 month = 1200

$P \times n \times r = 1200$

$P \times \frac{1}{12} \times 0.18 = 1200$ $\quad \therefore P = 80,000/-$

40. Compute the compound interest on ₹ 40,000 for 1.5 years @10% p.a. compounded half yearly.

→ $CI = P[(1+r)^n - 1]$

$= 40,000[1.05^3 - 1] = ₹ 6305/-$

41. What rate of interest p.a. doubles the investment in 7 years at compounded interest?

$A = P(1+r)^n$

$2P = P(1+r)^7$

$(1+r)^7 = 2$

$\therefore (1+r) = 2^{1/7}$

$r = 10.409736997\%$ p.a.

42. In what time will ₹ 8,000 amount to ₹ 8,820 at 10% p.a. compounded half yearly?

$A = P(1+r)^n$

$8820 = 8000\left(1+\frac{0.10}{2}\right)^{2n}$

$1.1025 = (1.05)^{2n}$

$\therefore 1.05^2 = 1.05^{2n}$

$\therefore 2n = 2$

$n = 1$ year

43. A certain sum invested at 4% p.a. compounded semi-annually amounts to ₹ 78,030 at the end of one year. Find the sum.

$A = P(1+r)^n$

$78030 = P(1.02)^2$

$P = ₹\,75,000/-$

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

a. 7 years b. 10 years c. 17 years (approx.) d. None

$A = 1.40P = P \times (1.02)^n$

$1.40 = 1.02^{17}$

45. The difference between simple interest & compound interest on a certain sum of money invested for 3 years at 6% p.a. is ₹ 110.16. The principle is -

a. 3,000 b. 3,700 c. 12,000 d. 10,000 e. None

$P\left[(1+r)^n - 1\right] - Pnr = 110.16$

$P\left[1.06^3 - 1\right] - P \times 3 \times 6\% = 110.16$

$0.191016P - 0.18P = 110.16$

$0.011016P = 110.16$

$P = ₹\,10,000/-$

46. The compound interest on ₹ 40,000 at 10% p.a. for 3 years when interest is payable quarterly is -

→ compound interest $= P\left[(1+r)^n - 1\right]$

$= ₹40{,}000\left[\left(1+\frac{0.10}{4}\right)^{3\times4} - 1\right]$

$= 40{,}000\left[1.025^{12} - 1\right] = ₹\ 13{,}795.552968$

47. Use calculator and find answers for the following questions :

$(1.0135)^{28}$ = 1.455677216 69

$(1.20635)^{48}$ = 8141.787 63281

$(1.10935)^{72}$ = 1757.673 94446

$(1.089123)^{66}$ = 279.947 98697 5

48. Present Value of Annuity Regular $= \left\{P.A \times \left[\frac{(1+r)^n - 1}{r}\right]\right\} \times \frac{1}{(1+r)^n}$ = [Future value of annuity factor × Disc. Factor]

$= \frac{P.A}{r} \times \left[1 - \frac{1}{(1+r)^n}\right]$ $= \frac{P.A}{r} \times \left[1 - (1+r)^{-n}\right]$

present value of annuity Regular = (P.A. × Annuity factor)

49. What is perpetuity?

Perpetuity is an annuity in which the periodic payments or receipts begin on a fixed date and continue indefinitely or perpetually.

present value of perpetuity = (periodical amount / r)

50. The present value of annuity of ₹ 3,000 for 15 years @4.50% p.a.c.i is

→ present value of annuity = periodical amt × A. Factor

$= 3{,}000 \times 10.739545\,7256$

$= ₹\ 32{,}219/-$

OR

present value of annuity $= 3{,}000 \times \left[\frac{1.0450^{15} - 1}{0.0450}\right] \times 0.516720\,44225$

$= ₹32{,}219/-$

51. A loan of ₹ 10,000 is to be paid back in 30 installments. The amount of each installment to cover principle and 4% p.a.c.i. is

a. 587.87 b. 587 c. 587.30 ~~d.~~ None of these

⟹ Present value of annuity regular = install amt × A.factor

$10,000 = \text{instal. amt} \times 17.292033 2979$

installment = ₹ 578.30

52. A person invests ₹ 500 at the end of each year @10% p.a. The amount standing to his credit one year after he has made his yearly investment for 12th time is:

~~a.~~ 11,761.36 b. 10,000 c. 12,000 d. None of these

Future value of annuity at the end of 12 years $= 500 \times \left(\frac{1.10^{12} - 1}{0.10}\right) = 10692.1418836$

$10692.1418836 + 10\% = 11,761.36$

53. A person bought a house paying ₹ 20,000 cash down & ₹ 4,000 at the end of each year for 25 years, at 5% p.a.c.i. The cash down price of house is :

a. ₹ 75,000 b. ₹ 76,376 ~~c.~~ ₹ 76,376 d. None of these

Present value

20,000 ⟹ 20,000

present value of 25 payment of 4000 each ⟹ 4000 × 14.093944 5646 = 56,376

cash down price = 76,376

54. The difference between simple interest and compound interest at 5% p.a. for 4 years on ₹ 20,000 is _____

→ Diff = CI − SI

$= 20,000\left[1.05^4 - 1\right] - (20,000 \times 4 \times 5\%)$

$= 4310.125 - 4000$

= ₹ 310.125

55. The compound interest on half yearly rests on ₹ 10,000, if rate for 1st and 2nd year being 6% and for third year being 9% p.a. is ₹ _____

a. 2,200 b. 2,287 c. 2,285 ~~d. None of these~~

$A = \left[10,000 \times (1.03)^4\right] \times 1.045^2 = 12,290$

$CI = 12,290 - 10,000 = 2290$

56. Vinod borrows ₹ 6 lakhs housing loan at 6% p.a. repayable in 20 annual equal installments commencing at the end of first year. How much annual payment is necessary.

a. ₹ 52,420 b. ₹ 52,400 ~~c.~~ ₹ 52,310 d. None of these

Present value of annuity regular = Install. amt × Annuity factor

$6,00,000 = \text{Inst. amt} \times 11.4699212174$

$\text{Instal. amt} = 52,310$

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

a. 88,448 b. 84,450 c. 84,449 ~~d.~~ 84,080

$P.A. \times \frac{(1+r)^n - 1}{r} = 40,00,000$

$P.A. \left(\frac{1.03^{30} - 1}{0.03}\right) = 40,00,000$

$P.A. = 84,077$

58. A TV can be purchased by paying ₹ 10,000 now and ₹ 20,000, ₹ 50,000, ₹ 90,000, ₹ 80,000 at the end of years 1,2,3,4 respectively. Find cash down price of TV if money is 12% effective.

a. ₹ 1,83,816 b. ₹ 1,82,618 c. ₹ 1,86,218 d. ₹ 1,62,861

Payment		present value
10,000	Now	10,000
20,000	After Y1	20,000 × 0.8928571428S = 17857
50,000	Y2	39860
90,000	Y3	64060
80,000	Y4	50841
	cash down price	1,82,618

59. Effective rate of 21.94% is equivalent to _____ % p.a.c.monthly

a. 21.94% b. 20% c. 20.66% d. 22.77%

$$\text{Eff. rate} = \left(1+\frac{r}{n}\right)^n - 1 \qquad \therefore \left(1+\frac{r}{12}\right)^{12} = 1.2194$$

$$0.2194 = \left(1+\frac{r}{12}\right)^{12} - 1 \qquad r = 20\%\ \text{p.a.c.m.}$$

60. Out of certain money (1/3)rd is invested at 3% , (1/6)th is invested at 6% and rest at 8% for 2 years. Simple Interest from all these investments is ₹ 600. The original sum is :

a. ₹ 3,500 b. ₹ 4,000 c. ₹ 5,000 d. ₹ 4,500

$$\left(\frac{P}{3}\right) \times 3\% \times 2 = 0.02P$$

$$\frac{P}{6} \times 6\% \times 2 = 0.02P$$

$$\left(P - \frac{P}{3} - \frac{P}{6}\right) \times 8\% \times 2 = \left(\frac{6P-2P-P}{6}\right) \times 8\% \times 2 = 0.08P$$

$$0.12P = 600$$

$$P = ₹5000$$

61. Population of a village is 10,000. If it increases at 10% p.a. What will be its population after 3 years?

a. 13,310 b. 14,220 c. 17,908 d. 13,000

$A = 10,000 \times (1.10)^3$

$= 13,310$

62. On a certain sum simple interest at the end of 6.25 years become $(3/8)^{th}$ of sum. The rate of interest is _____

a. 7% b. 9% c. 5% d. 6%

$SI = P.n.r$

$\frac{3}{8}P = P \times 6.25 \times r$

$0.06 = r$

63. The amount of certain sum of money with simple interest at certain rate of interest is ₹ 2,660 in 3 years and ₹ 3,100 in 5 years. The rate of interest is :

a. 12% b. 11% c. ₹ 13% d. 10%

Sum invested	1 Y	2 Y	3 Y	4 Y	5 Y
2000	2220	2440	2660	2880	3100

int. of 1 year = 220

64. At what rate of compound interest money will amount to 8 times in 20 years?

a. 12.75% b. 11.22% c. 10.96% d. None of these

$\Rightarrow A = P(1+r)^n$

$8P = P(1+r)^{20}$

$\therefore (1+r) = 8^{1/20}$ $\quad r = 10.959725861\%$

65. At what rate of simple interest money will become 8 times in 20 years?

a. 35% b. 40% c. 30% d. None of these

$A = P(1+nr)$

$8P = P(1+20r)$

$7 = 20r \quad r = 35\%$

66. In what time ₹ 1,00,000 will become ₹ 8,00,000, If rate of interest is 10% p.a.s.i

a. 77 years b. 7 years c. 70 years d. 17 years

$8,00,000 = 1,00,000\,(1 + n \times 0.10)$

$n = 70$ years

67. A sum of money triples itself with compound interest in 9 years. How many times it will become after 81 years?

a. 27 times b. 6,561 times c. 81 times d. 19,683 times

After years

9	18	27	36	45	54	63	72	81
P	3P	9P	27P	81P	243P	729P	2187P	6561P	19,683P

68. A machine costs ₹ 5,20,000 with an estimated life of 25 years. A sinking fund is created to replace it by a new model at 25% higher cost after 25 years with a scrap value of realisation of ₹ 25,000. What amount should be set aside every year if money is 3.50% effective?

a. ₹ 16,000 b. ₹ 16,564 c. ₹ 16,046 d. ₹ 16,005

Money required after 25 years = (5,20,000 + 25%) − 25,000
= 6,25,000

$$P.A. \times \left(\frac{1.035^{25}-1}{0.035}\right)$$

P.A. = 16046

69. A sum of ₹ 80,000 invested in a bank @10% p.a.s.i. for 5 years. Find amount, simple interest.

Year	Opening Balance (₹)	Interest (₹)	Closing Balance (₹)
1	0 + 80,000	80,000 × 10% = 8,000	88,000
2	88,000	80,000 × 10% = 8,000	96,000
3	96,000	80,000 × 10% = 8,000	1,04,000
4	1,04,000	80,000 × 10% = 8,000	1,12,000
5	1,12,000	80,000 × 10% = 8,000	1,20,000

Amount receivable at the end of 5 years = ₹ 1,20,000

Simple interest for 5 years = ₹ 1,20,000 − ₹ 80,000 = ₹ 40,000

40,000 = 80,000 × 5 × 10%

$$SI = p \cdot n \cdot r$$

Amount = p + SI

$$= p + pnr = p[1 + nr]$$

70. Mr. A deposited ₹ 80,000 in a bank @10% p.a.c.i. for 5 years. Find amount receivable after 5 years and compound interest.

Year	Opening Balance (₹)	Interest (₹)	Closing Balance (₹)
1	0 + 80,000	80,000 x 10% = 8,000	88,000
2	88,000	88,000 x 10% = 8,800	96,800
3	96,800	96,800 x 10% = 9680	1,06,480
4	1,06,480	10,648	1,17,128
5	1,17,128	11,712.80	1,28,840.80

Amount receivable at the end of 5 years = 1,28,840.80

Compound Interest = 1,28,840.48 − 80,000 = 48,840.80

$1,28,840.80 = (80,000 \times 1.10) \times 1.10 \times 1.10 \times 1.10 \times 1.10$

$1,28,840.80 = 80,000 \times (1+0.10)^5$

$A = P(1+r)^n$

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

$= P[(1+r)^n - 1]$

71. P = ₹ 1,00,000; r = 12% p.a.c.q; n = 2 years, A = ?

	Opening Balance (₹)	Interest (₹)	Closing Balance (₹)
Year 1 Q1	1,00,000	3,000	1,03,000
Q2	1,03,000	3,090	1,06,090
Q3	1,06,090	3,182.70	1,09,272.70
Q4	1,09,272.70	3,278 .181	1,12,550.881
Year 2 Q1	1,12,550.881	3,376.52643	1,15,927.40743
Q2	1,15,927.40743	3,477.822222	1,19,405.229652
Q3	1,19,405.229652	3,582.15688956	1,22,987.386541
Q4	1,22,987.386541	3,689.62159623	1,26,677.008137

Amount to be received after 2 years = $P(1+r)^n$ (2 x 4)

$= 1,00,000\left(1+\frac{0.12}{4}\right)$

$= 1,00,000 \times (1.03)^8 = ₹\ 1,26,677.008137$

r = Rate of interest for the conv. period

n = No. of conversion periods

72. You require ₹ 32,00,000 at the end of 9 years from now. Find the amount you should keep aside at the end of every year, if money is 14% effective

a. ₹ 2,20,819 b. ₹ 3,00,000 c. ₹ 3,55,556 d. None of these

$$32,00,000 = P.A. \times \left(\frac{1.14^9 - 1}{0.14}\right)$$

$$P.A. = 1,98,939$$

73. Simple interest on ₹ 25,00,000 for 8 years and 4 months @ 19.25% p.a.s.i is

$$SI = P.n.r$$
$$= 25,00,000 \times 8.333333333 \times 19.25\%$$
$$= ₹\ 40,10,416.666666$$

74. A sum of ₹ 12,000 deposited at compound interest becomes double after 5 years. After 20 years it will become :

a. ₹ 1,44,000 b. ₹ 2,40,000 c. ₹ 1,92,000 d. None of these

After years

5	10	15	20
12000	24000	48000	96000	1,92,000

75. A man deposits ₹ 2,000 @ 4% p.a. and ₹ 3,000 @ 14% p.a. Find average rate of return he is earning on whole sum?

a. 10% b. 5% c. 14% d. None of these

₹ 2000 × 4% = ₹ 80

₹ 3000 × 14% = ₹ 420

₹ 5000 $\xrightarrow{10\%}$ ₹ 500

Formulae

Simple interest $= P.n.r$

Amount when int. is simple $= P(1+nr)$

compound interest $= P\left[(1+r)^n - 1\right]$

Amount when int. is compound $= P(1+r)^n$

Eff. rate of int $= \left(1+\frac{r}{n}\right)^n - 1$

Future value = present value $\times (1+r)^n$

present value = Future value $\times$ Discounting Factor

Discounting Factor $= \frac{1}{(1+r)^n}$

Future value of annuity regular = Periodical amt $\times \left[\frac{(1+r)^n - 1}{r}\right]$

Future value of annuity due or immediate = Periodical amt $\times \left[\frac{(1+r)^n - 1}{r}\right] \times (1+r)$

present value of annuity regular = (periodical amt $\times$ Annuity Factor)

present value of annuity due = (periodical amt $\times$ Annuity Factor) $\times (1+r)$

present value of perpetuity = (periodical amount $/ r$)

How to find Discounting factor on calculator ? (for nth year)

$\Rightarrow$

$1 \div (1+r)$ then press $=, =, =, \ldots\ldots$

till step count comes $(n+2)$

How to find Annuity factor on calculator ? (for n years)

$\Rightarrow$

$1 \div (1+r)$ then press $=, =, =, \ldots\ldots$

till step count comes $(n+2)$

then press GT

$$\text{Annuity factor} = \left[\frac{1}{(1+r)^1} + \frac{1}{(1+r)^2} + \frac{1}{(1+r)^3} + \ldots\ldots \text{---} + \frac{1}{(1+r)^n} \right]$$

LIFE IS...

10%

WHAT HAPPENS TO US

& 90%

HOW YOU REACT TO IT !

- CA VINOD REDDY -

MINDSET IS EVERYTHING

- CA VINOD REDDY -

MINDSET IS EVERYTHING

- CA VINOD REDDY -