TYPE-II

1. (1)	**2.** (1)	**3.** (2)	**4.** (4)
5. (2)	**6.** (3)	**7.** (3)	**8.** (3)
9. (4)	**10.** (3)	**11.** (3)	**12.** (4)
13. (3)	**14.** (2)	**15.** (*)	**16.** (1)
17. (2)	**18.** (3)	**19.** (4)	**20.** (2)
21. (2)	**22.** (3)	**23.** (4)	**24.** (3)

TYPE-III

1. (3)	**2.** (2)	**3.** (1)	**4.** (1)
5. (2)	**6.** (2)	**7.** (2)	**8.** (3)

TYPE-IV

1. (4)	**2.** (3)	**3.** (2)	**4.** (4)
5. (4)	**6.** (1)	**7.** (3)	**8.** (1)
9. (3)	**10.** (2)	**11.** (1)	**12.** (2)
13. (3)	**14.** (1)	**15.** (3)	**16.** (3)
17. (2)	**18.** (2)	**19.** (3)	**20.** (2)
21. (1)	**22.** (4)	**23.** (1)	**24.** (3)
25. (3)			

TYPE-V

1. (4)	**2.** (2)	**3.** (4)	**4.** (1)
5. (3)	**6.** (4)	**7.** (2)	**8.** (1)
9. (1)	**10.** (2)	**11.** (3)	

TYPE-VI

1. (3)	**2.** (1)	**3.** (1)	**4.** (1)
5. (4)	**6.** (1)	**7.** (3)	**8.** (1)
9. (4)	**10.** (4)	**11.** (1)	**12.** (1)
13. (3)	**14.** (4)		

TYPE-VII

1. (1)	**2.** (1)	**3.** (1)	**4.** (4)
5. (3)	**6.** (4)	**7.** (1)	**8.** (2)
9. (3)	**10.** (2)	**11.** (3)	**12.** (4)
13. (2)	**14.** (4)	**15.** (2)	**16.** (1)
17. (3)	**18.** (3)	**19.** (3)	**20.** (1)
21. (1)	**22.** (2)	**23.** (2)	**24.** (*)
25. (3)	**26.** (1)	**27.** (4)	**28.** (2)
29. (1)	**30.** (1)		

▰ EXPLANATIONS ▰

TYPE-I

1. (2) Using Rule 1,

$$P = \frac{150 \times 100}{4} \times \frac{2}{1} = ₹\ 7500$$

2. (3) Using Rule 1,
Principal (P) = ₹ 1600
T = 2 years 3 months

$$= \left(2 + \frac{3}{12}\right)yrs. = \left(2 + \frac{1}{4}\right)yrs. = \frac{9}{4}\ yrs.$$

S.I = ₹ 252
R = % rate of interest per annum

$$\Rightarrow R = \frac{100 \times S.I.}{P \times t}$$

$$= \frac{100 \times 252}{1600 \times \frac{9}{4}}$$

Rate of interest = 7% per annum.

3. (4) If the principal be x and rate of interest be r% per annum, then
SI after 1 year = 920 – 880
= ₹ 40
∴ SI after 2 years = ₹ 80
$\Rightarrow$ 880 = x + 80
$\Rightarrow$ x = ₹ (880 – 80) = ₹ 800
Aliter : Using Rule 12,

$$P = \left(\frac{A_2T_1 - A_1T_2}{T_1 - T_2}\right)$$

$$= \left(\frac{920 \times 2 - 880 \times 3}{2 - 3}\right)$$

$$= \left(\frac{1840 - 2640}{-1}\right)$$

$$= \frac{-800}{-1} = ₹\ 800$$

4. (1) Using Rule 1,
If rate of interest be R% p.a. then,

$$SI = \frac{Principal \times Time \times Rate}{100}$$

$$\therefore \frac{6000 \times 2 \times R}{100} + \frac{1500 \times 4 \times R}{100}$$

= 900
$\Rightarrow$ 120 R + 60R = 900
$\Rightarrow$ 180R = 900

$$\Rightarrow R = \frac{900}{180} = 5\%$$

5. (4) Using Rule 1,
Let the rate of interest per annum be r%
According to the question,

$$\frac{5000 \times 2 \times r}{100} + \frac{3000 \times 4 \times r}{100} = 2200$$

$\Rightarrow$ 100r + 120r = 2200
$\Rightarrow$ 220 r = 2200

$$\Rightarrow r = \frac{2200}{220} = 10\%$$

6. (1) Simple interest for 2 years
= ₹ (568 – 520) = ₹ 48
∴ Interest for 5 years

$$= ₹\ \frac{48}{2} \times 5 = ₹\ 120$$

Principal = ₹ (520 – 120) = ₹ 400
Aliter : Using Rule 12,

$$P = \left(\frac{A_2T_1 - A_1T_2}{T_1 - T_2}\right)$$

$$= \left(\frac{568 \times 5 - 520 \times 7}{5 - 7}\right)$$

$$= \left(\frac{2840 - 3640}{-2}\right)$$

$$= \frac{-800}{-2} = ₹\ 400$$

7. (3) Using Rule 1,
Simple interest gained from ₹ 500

$$= \frac{500 \times 12 \times 4}{100} = ₹\ 240$$

Let the other Principal be x.
S.I. gained = ₹ (480 – 240)
= ₹ 240

$$\therefore \frac{x \times 10 \times 4}{100} = 240$$

$$\Rightarrow x = \frac{240 \times 100}{40} = ₹\ 600$$

8. (3) Difference in rate

$$= \left(8 - 7\frac{3}{4}\right)\% = \frac{1}{4}\%$$

Let the capital be ₹ x.

$$\therefore \frac{1}{4}\% \text{ of } x = 61.50$$

$\Rightarrow$ x = 61.50 × 100 × 4
= ₹ 24600

9. (4) Using Rule 1,
Let the sum lent to C be x
According to the question,

$$\frac{2500 \times 7 \times 4}{100} + \frac{x \times 7 \times 4}{100} = 1120$$

or $2500 \times 28 + 28x = 112000$
or $2500 + x = 4000$
or $x = 4000 - 2500 = 1500$

10. (4) S.I. for $1\frac{1}{2}$ years

= ₹ $(873 - 756)$ = ₹ 117
S.I. for 2 years

= ₹ $\left(117 \times \frac{2}{3} \times 2\right)$ = ₹ 156

∴ Principal = $756 - 156$ = ₹ 600
Now, P = 600, T = 2,
S.I. = 156

∴ R = $\frac{100 \times \text{S.I.}}{P \times T}$

$= \frac{100 \times 156}{600 \times 2} = 13\%$

Aliter : Using Rule 12,
Rate of interest

$= \left(\frac{A_1 - A_2}{A_2 T_1 - A_1 T_2}\right) \times 100$

$= \left(\frac{756 - 873}{873 \times 2 - 756 \times \frac{7}{2}}\right) \times 100$

$= \left(\frac{-117}{1746 - 2646}\right) \times 100$

$= \left(\frac{-117}{-900}\right) \times 100 = 13\%$

11. (3) Using Rule 1,

$P = \frac{A \times 100}{100 + r \times t}$

$= \frac{7000 \times 100}{100 + \frac{10}{3} \times 5}$

$= \frac{7000 \times 100 \times 3}{350} = ₹\ 6000$

12. (4) Using Rule 1,
Let the principal be x.

S.I. $= \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

$\Rightarrow 5400 = \frac{x \times 12 \times 3}{100}$

$\Rightarrow x = \frac{5400 \times 100}{12 \times 3} = ₹\ 15000$

13. (3) Principal + S.I. for $\frac{5}{2}$ years

= ₹ 1012 ...(i)
Principal + S.I. for 4 years
= ₹ 1067.20 ...(ii)
Subtracting equation (i) from (ii)

S.I. for $\frac{3}{2}$ years = ₹ 55.20

∴ S.I. for $\frac{5}{2}$ years

$= 55.20 \times \frac{2}{3} \times \frac{5}{2}$ = ₹ 92

∴ Principal
= ₹ $(1012 - 92)$ = ₹ 920

∴ Rate $= \frac{92 \times 100}{920 \times \frac{5}{2}}$

$= \frac{2 \times 92 \times 100}{920 \times 5} = 4\%$

Aliter : Using Rule 12,

R = $\left(\frac{A_1 - A_2}{A_2 T_1 - A_1 T_2}\right) \times 100$

$= \left(\frac{1012 - 1067.20}{1067.20 \times \frac{5}{2} - 1012 \times 4}\right) \times 100$

$= \frac{-55.2}{(2668 - 4048)} \times 100$

$= \frac{-55.2}{-1380} \times 100$

= 4%

14. (2) Principal + SI for 2 years
= ₹ 720 .... (i)
Principal + SI for 7 years
= ₹ 1020 .....(ii)
Subtracting equation (i) from (ii) get,
SI for 5 years
= ₹ $(1020 - 720)$ = ₹ 300
∴ SI for 2 years

= ₹ $300 \times \frac{2}{5}$ = ₹ 120

∴ Principal
= ₹ $(720 - 120)$ = ₹ 600
Aliter : Using Rule 12,

P = $\left(\frac{A_2 T_1 - A_1 T_2}{T_1 - T_2}\right)$

$= \left(\frac{1020 \times 2 - 720 \times 7}{2 - 7}\right)$

$= \left(\frac{2040 - 5040}{-5}\right)$

$= \frac{-3000}{-5} = ₹\ 600$

15. (4) Using Rule 1,
The sum of money will give ₹ 365 as simple interest in a year.

$\Rightarrow$ S.I. = $\frac{PRT}{100}$

$\Rightarrow 365 = \frac{P \times 5 \times 1}{100}$

$\Rightarrow$ P $= \frac{365 \times 100}{5} = ₹\ 7300$

16. (3) Using Rule 1,
Let the sum be x.

Using formula, I = $\frac{PRT}{100}$ we have

$\frac{x \times \frac{15}{12} \times \frac{15}{2}}{100} - \frac{x \times \frac{8}{12} \times \frac{25}{2}}{100}$

= 32.50

$\Rightarrow \frac{25x}{2400}$ = 32.50

$\Rightarrow x = \frac{32.50 \times 2400}{25}$ = 3120

∴ Required sum = ₹ 3120

17. (1) Let each instalment be x
Then,

$\left(x + \frac{x \times 5 \times 1}{100}\right) + \left(x + \frac{x \times 5 \times 2}{100}\right)$

$+ \left(x + \frac{x \times 5 \times 3}{100}\right) + x = 6450$

$\Rightarrow \left(x + \frac{x}{20}\right) + \left(x + \frac{x}{10}\right) +$

$\left(x + \frac{3x}{20}\right) + x = 6450$

$\Rightarrow \frac{21x}{20} + \frac{11x}{10} + \frac{23x}{20} + x = 6450$

$\Rightarrow \frac{21x + 22x + 23x + 20x}{20}$

= 6450

$\Rightarrow \frac{86x}{20} = 6450$

$\Rightarrow x = \dfrac{6450 \times 20}{86} = ₹\ 1500$

Aliter : Using Rule 10,
Equal instalment

$= \dfrac{6450 \times 200}{4\big[200 + (4-1) \times 5\big]}$

$= \dfrac{6450 \times 200}{4(215)}$

$= \dfrac{6450 \times 50}{215} = ₹\ 1500$

18. (1) Using Rule 1,
Interest = ₹ (81–72)= ₹ 9
Let the time be t years.

Then, $9 = \dfrac{72 \times 25 \times t}{4 \times 100}$

$\Rightarrow t = \dfrac{9 \times 400}{72 \times 25} = 2$ years.

19. (1) Using Rule 1,
Time from 11 May to 10 September, 1987
= 21 + 30 + 31 + 31 + 10
= 123 days

$\therefore$ Time = 123 days $= \dfrac{123}{365}$ year

$\therefore$ S.I. $= \dfrac{7300 \times 123 \times 5}{365 \times 100} = ₹\ 123$

20. (3) Using Rule 1,
Case I :

S.I. $= \dfrac{5000 \times 2 \times 4}{100} = ₹\ 400$

Case II :

S.I. $= \dfrac{5000 \times 25 \times 2}{100 \times 4} = ₹\ 625$

$\therefore$ Gain = ₹ (625 – 400) = ₹ 225

21. (3) Using Rule 1,
Let the sum lent at 4% = Rs.x
$\therefore$ Amount at 5%= (16000 – x)
According to the question,

$\dfrac{x \times 4 \times 1}{100} + \dfrac{(16000 - x) \times 5 \times 1}{100}$

= 700
$\Rightarrow 4x + 80000 - 5x = 70000$
$\Rightarrow x = 80000 - 70000$
= ₹ 10000

22. (4) Using Rule 1,
After 10 years,

SI $= \dfrac{1000 \times 5 \times 10}{100} = ₹\ 500$

Principal for 11th year
= 1000 + 500 = ₹ 1500
SI = ₹ (2000 – 1500) = ₹ 500

$\therefore$ T $= \dfrac{SI \times 100}{P \times R} = \dfrac{500 \times 100}{1500 \times 5}$

$= \dfrac{20}{3}$ years $= 6\dfrac{2}{3}$ years

$\therefore$ Total time $= 10 + 6\dfrac{2}{3}$

$= 16\dfrac{2}{3}$ years

23. (4)
P + S.I. for 5 years = 5200 ..(i)
P + SI for 7 years = 5680 ...(ii)
On subtracting equation (i) from (ii),
SI for 2 years = 480
$\therefore$ SI for 1 year = ₹ 240
$\therefore$ From equation (i),
P + 5 × 240 = 5200
$\Rightarrow$ P = 5200 – 1200 = ₹ 4000

$\therefore$R $= \dfrac{SI \times 100}{T \times P}$

$= \dfrac{240 \times 100}{1 \times 4000}$ = 6%

Aliter : Using Rule 12,

R $= \left(\dfrac{A_1 - A_2}{A_2 T_1 - A_1 T_2}\right) \times 100$

$= \left(\dfrac{5200 - 5680}{5680 \times 5 - 5200 \times 7}\right) \times 100$

$= \dfrac{-480}{28400 - 36400} \times 100$

$= \dfrac{-480}{-8000} \times 100$

= 6%

24. (3) Using Rule 1,
S.I. = 956 – 800 = Rs. 156

$\therefore$ Rate $= \dfrac{S.I. \times 100}{Principal \times Time}$

$= \dfrac{156 \times 100}{800 \times 3}$ = 6.5% per annum

$\therefore$ New rate = 10.5%

$\therefore$ S.I. $= \dfrac{Principal \times Time \times Rate}{100}$

$= \dfrac{800 \times 3 \times 10.5}{100} = ₹\ 252$

$\therefore$ Amount = 800 + 252 = ₹ 1052

25. (1) Using Rule 1,
Let the rate of interest be R per cent per annum.

$\therefore$ $\dfrac{400 \times 2 \times R}{100} + \dfrac{550 \times 4 \times R}{100}$

$+ \dfrac{1200 \times 6 \times R}{100} = 1020$

$\Rightarrow 8R + 22R + 72R = 1020$
$\Rightarrow 102R = 1020$

$\Rightarrow R = \dfrac{1020}{102} = 10\%$

26. (1) Using Rule 1,

$4200 = \dfrac{29400 \times 6 \times R}{100}$

$\Rightarrow R = \dfrac{4200}{294 \times 6} = \dfrac{50}{21} = 2\dfrac{8}{21}\%$

27. (2) Using Rule 1,
Let the amount lent at 4% be x
$\therefore$ Amount lent at 5% = (60000 – x)
According to the question,

$\dfrac{(60000 - x) \times 5 \times 1}{100} + \dfrac{x \times 4 \times 1}{100}$

= 2560
$\Rightarrow 300000 - 5x + 4x = 256000$
$\Rightarrow x = 300000 - 256000$
= ₹ 44000

28. (4) Principal + interest for 8 years= ₹ 2900... (i)
Principal + interest for 10 years
= ₹ 3000   ... (ii)
Subtracting equation (i) from (ii)
Interest for 2 years = ₹ 100
$\therefore$ Interest for 8 years

$= \dfrac{100}{2} \times 8 = ₹\ 400$

From equation (i),
Principal = ₹ (2900 – 400)
= ₹ 2500

$\therefore$ Rate $= \dfrac{S.I \times 100}{Time \times Principal}$

$= \dfrac{400 \times 100}{8 \times 2500} = 2\%$

Aliter : Using Rule 12,

R $= \left(\dfrac{A_1 - A_2}{A_2 T_1 - A_1 T_2}\right) \times 100$

$= \left(\dfrac{2900 - 3000}{3000 \times 8 - 2900 \times 10} \right) \times 100$

$= \left(\dfrac{-100}{24000 - 29000} \right) \times 100$

$= \dfrac{-100}{-5000} \times 100$

$= 2\%$

29. (1) Using Rule 1,

Time $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{1080 \times 100}{3000 \times 12} = 3 \text{ years}$

30. (3) Interest for 1 year
$= ₹ (925 - 850) = ₹ 75$

∴ If a sum becomes a_1 in t_1 years and a_2 in t_2 years then rate of

interest $= \dfrac{100(a_2 - a_1)}{(a_1 t_2 - a_2 t_1)}\%$

$= \dfrac{100(925 - 850)}{850 \times 4 - 3 \times 925} = \dfrac{7500}{625} = 12\%$

∴ Principal $= \dfrac{\text{SI} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{75 \times 100}{1 \times 12} = ₹ 625$

Aliter : Using Rule 12,

$P = \left(\dfrac{A_2 T_1 - A_1 T_2}{T_1 - T_2} \right)$

$= \dfrac{925 \times 3 - 850 \times 4}{3 - 4}$

$= \dfrac{2775 - 3400}{-1}$

$= \dfrac{-625}{-1} = ₹ 625$

31. (2) Using Rule 1,
S.I. = 2641.20 − 1860
$= ₹ 781.2$

Time $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{781.2 \times 100}{1860 \times 12} = 3.5 = 3\dfrac{1}{2}$ years

32. (2) Using Rule 18 of 'percentage' chapter,
Present population

$= 10000 \left(1 - \dfrac{20}{100} \right)^2$

$= 10000 \times \dfrac{4}{5} \times \dfrac{4}{5} = 6400$

33. (3) Using Rule 1,
Annual interest
$= 365 \times 2 = ₹ 730$

Principal $= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{730 \times 100}{1 \times 5} = ₹ 14600$

34. (4) If principal $= x$ and rate $= r\%$ per annum, then

$1380 = x + \dfrac{x \times 3 \times r}{100}$ .....(i)

$1500 = x + \dfrac{x \times 5 \times r}{100}$ .....(ii)

S.I. for two years $= 1500 - 1380$
$= ₹ 120$

∴ $\dfrac{x \times 2 \times r}{100} = 120$

∴ $\dfrac{xr}{100} = 60$ .....(iii)

∴ From equation (i)
$1380 = x + 60 \times 3$
$\Rightarrow x = 1380 - 180 = ₹ 1200$
From equation (iii)

$\dfrac{1200 \times r}{100} = 60$

$\Rightarrow r = \dfrac{6000}{1200} = 5\%$ per annum

Aliter : Using Rule 12,

$R = \left(\dfrac{A_1 - A_2}{A_2 T_1 - A_1 T_2} \right) \times 100 \%$

$= \left(\dfrac{1380 - 1500}{1500 \times 3 - 1380 \times 5} \right) \times 100\%$

$= \dfrac{-120}{4500 - 6900} \times 100$

$= \dfrac{-120}{-2400} \times 100$

$= 5\%$

35. (3) S.I. for 1 year
$= 14250 - 12900 = \text{Rs. } 1350$
S.I. for 4 years $= 1350 \times 4$
$= ₹ 5400$
∴ Principal $= 12900 - 5400$
$= ₹ 7500$

∴ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{5400 \times 100}{7500 \times 4}$

$= 18\%$ per annum
Aliter : Using Rule 12,

$R = \left(\dfrac{A_1 - A_2}{A_2 T_1 - A_1 T_2} \right) \times 100$

$= \left(\dfrac{12900 - 14250}{14250 \times 4 - 12900 \times 5} \right) \times 100$

$= \dfrac{-1350}{57000 - 64500} \times 100$

$= \dfrac{1350}{7500} \times 100$

$= 18\%$

36. (1) Using Rule 1,
Required time $= t$ years

S.I. $= \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

∴ $\dfrac{6000 \times 4 \times 5}{100} = \dfrac{8000 \times 3 \times t}{100}$

$\Rightarrow 6000 \times 4 \times 5 = 8000 \times 3 \times t$

∴ $t = \dfrac{6000 \times 4 \times 5}{8000 \times 3} = 5$ years

37. (2) Using Rule 1,

Principal $= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{1 \times 100}{\dfrac{1}{365} \times 5} = \dfrac{365 \times 100}{5}$

$= \text{Rs. } 7300$

38. (1) S.I. for 5 years
$= \text{Rs. } (1020 - 720) = \text{Rs. } 300$
∴ S.I. for 2 years

$= \dfrac{300}{5} \times 2 = \text{Rs. } 120$

∴ Principal $= \text{Rs. } (720 - 120)$
$= \text{Rs. } 600$

39. (4) Using Rule 1,
Number of days from 5th January to 31st May $= 26 + 28 + 31 + 30 + 31 = 146$

∴ S.I.

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \dfrac{36000 \times 146 \times 9.5}{365 \times 100}$

$= \text{Rs. } 1368$

40. (3) $\dfrac{\text{Principal}}{\text{Interest}} = \dfrac{10}{3}$

$\Rightarrow \dfrac{\text{Interest}}{\text{Principal}} = \dfrac{3}{10}$

$\therefore$ Time $= \dfrac{\text{S.I} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{3}{10} \times \dfrac{100}{6} = 5$ years

41. (1) Principal

$= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{60 \times 100}{5 \times 6} = $ Rs. 200

42. (1) According to the question,
S.I. for 2 years 6 months
= Rs. (5500 – 4000)

$\Rightarrow$ S.I. for $\dfrac{5}{2}$ years = Rs. 1500

$\therefore$ S.I. for 1 year $= \dfrac{1500 \times 2}{5}$

= Rs. 600

$\therefore$ S.I. for 2 years = Rs. 1200

$\therefore$ Principal = Rs. (4000 – 1200)
= Rs. 2800

$\therefore$ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Pricipal} \times \text{Time}}$

$= \dfrac{1200 \times 100}{2800 \times 2} = \dfrac{150}{7}$

$= 21\dfrac{3}{7}$ % per annum.

43. (2) Principal $= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{840 \times 100}{8 \times 5} = $ Rs. 2100

Case II,
S.I. = Rs. 840
Principal = Rs. 2100
Time = 5 years

Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{840 \times 100}{2100 \times 5} = 8\%$ per annum

44. (2) Let first part be x.
$\therefore$ Second part
= Rs. (2800 – x)
According to the question,

S.I. $= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\therefore \quad \dfrac{x \times 5 \times 9}{100}$

$= \dfrac{(2800 - x) \times 6 \times 10}{100}$

$\Rightarrow 3x = 4 \times 2800 - 4x$

$\Rightarrow 7x = 4 \times 2800$

$\Rightarrow x = \dfrac{4 \times 2800}{7} = $ Rs. 1600

$\therefore$ Second part
= Rs. (2800 – 1600) = Rs. 1200

45. (2) According to the question,

$\dfrac{\text{S.I.}}{\text{Principal}} = \dfrac{2}{5}$

Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{2}{5} \times \dfrac{100}{5} = 8\%$ per annum

= 0.08 per annum

46. (1) Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{280 \times 100}{400 \times 10}$

= 7% per annum

47. (3) Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{\dfrac{1}{100} \times 100}{1 \times \dfrac{1}{12}} = 12\%$ p.a.

48. (3) S.I.

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= $ Rs. $\left(4000 \times \dfrac{18}{12} \times \dfrac{12}{100}\right)$

= Rs. 720

49. (2) Time $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{1080 \times 100}{3000 \times 12} = 3$ years

50. (3) Let the principal be Rs. x.
According to the question,
x + S.I. for 2 years
= Rs. 5182 ...(i)
x + S.I. for 3 years
= Rs. 5832 ...(ii)

By equation (ii) – (i),
S.I. for 1 year
= Rs. (5832 – 5182)
= Rs. 650
$\therefore$ S.I. for 2 years
= Rs. (2 × 650) = Rs. 1300
$\therefore$ Principal
= Rs. (5182 – 1300)
= Rs. 3882

51. (2) Principal $= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$= \dfrac{\text{R} \times 100}{2 \times \text{R}} = $ Rs. 50

52. (3)

S.I. $= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \dfrac{2000 \times 2 \times 5}{100} = $ Rs. 200

$\therefore$ Required amount
= Rs. (2000 + 200)
= Rs. 2200

53. (1) S.I. = Amount – Principal
= Rs. (6900 – 6000)
= Rs. 900

$\therefore$ Rate $= \dfrac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{900 \times 100}{6000 \times 3}$

= 5% per annum

TYPE-II

1. (1) Principal = P

Amount $= \dfrac{7p}{6}$

S.I. $= \dfrac{7p}{6} - P = \dfrac{P}{6}$

$\therefore R = \dfrac{S.I \times 100}{P \times T} = \dfrac{P \times 100}{6 \times p \times 3}$

$= \dfrac{50}{9} = 5\dfrac{5}{9}\%$

Aliter : Using Rule 3,

R% $= \dfrac{\left(\dfrac{7}{6} - 1\right) \times 100\%}{3}$

$= \dfrac{1}{18} \times 100\%$

$= \dfrac{50}{9}\%$

$= 5\dfrac{5}{9}\%$

2. (1) Let the principal be Re.1

$$\therefore \text{ S.I.} = \frac{41}{40} - 1 = \frac{1}{40}$$

Now, rate $= \dfrac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$

$$= \frac{\frac{1}{40} \times 100}{1 \times \frac{1}{4}} = \frac{100 \times 4}{40} = 10\%$$

Aliter : Using Rule 3,

$$R = \frac{\left(\frac{41}{40} - 1\right) \times 100\%}{\frac{1}{4}}$$

$$= \frac{1}{40} \times 4 \times 100\%$$

$$= 10\%$$

3. (2) **Case-I**

Let the principal be x

Amount $= 3x$

$\therefore$ Interest $= 2x$

Time $= 20$ years

$$\therefore \text{ I} = \frac{\text{PRT}}{100} \Rightarrow 2x = \frac{x \times R \times 20}{100}$$

$$\Rightarrow R = 10\%$$

Case-II

I $= x$

P $= x$

R $= 10$

T $= ?$

$$\therefore \text{ I} = \frac{\text{PRT}}{100} \Rightarrow x = \frac{x \times 10 \times T}{100}$$

$\therefore$ T $= 10$ years.

Aliter : Using Rule 3,

$$R\% = \frac{(3-1)}{20} \times 100\%$$

$$R\% = 10\%$$

Now, T $= \dfrac{(n-1)}{R}$ years

$$T = \frac{2-1}{10} \times 100$$

$$\boxed{T = 10 \text{ years}}$$

4. (4) Using Rule 1,

Let P be the principal and R% rate of interest.

$$\therefore \text{ S.I.} = \frac{\text{PR} \times 10}{100} = \frac{\text{PR}}{10}$$

According to the question,

$$\frac{\text{PR}}{10} = \left(P + \frac{\text{PR}}{10}\right) \times \frac{2}{5}$$

$$\Rightarrow \frac{R}{10} = \left(1 + \frac{R}{10}\right) \times \frac{2}{5}$$

$$\Rightarrow \frac{R}{10} = \frac{2}{5} + \frac{R}{25}$$

$$\Rightarrow \frac{R}{10} - \frac{R}{25} = \frac{2}{5}$$

$$\Rightarrow \frac{5R - 2R}{50} = \frac{2}{5}$$

$$\Rightarrow \frac{3R}{50} = \frac{2}{5}$$

$$\Rightarrow R = \frac{50 \times 2}{3 \times 5} = \frac{20}{3} = 6\frac{2}{3}\%$$

5. (2) Using Rule 1,

SI $= ₹ (7200 - 6000)$

$= ₹ 1200$

$$\therefore \text{ SI} = \frac{\text{PRT}}{100}$$

$$\Rightarrow 1200 = \frac{6000 \times R \times 4}{100}$$

$$\Rightarrow R = \frac{1200 \times 100}{6000 \times 4} = 5\%$$

New rate of R $= 5 \times 1.5 = 7.5\%$

Then, SI $= \dfrac{6000 \times 7.5 \times 5}{100}$

$= ₹ 2250$

$\therefore$ Amount $= ₹ (6000 + 2250)$

$= ₹ 8250$

6. (3) Let the principal be x.

Case-I

$$2x = \frac{x \times R \times 15}{100}$$

$$\Rightarrow R = \frac{2 \times 100}{15} = \frac{40}{3}\%$$

Case-II

SI $= 4x$

$$\therefore 4x = \frac{x \times 40 \times T}{300}$$

$$\Rightarrow T = \frac{4 \times 300}{40} = 30 \text{ years}$$

Aliter : Using Rule 3,

$$R = \frac{(3-1)}{15} \times 100\%$$

$$= \frac{2}{15} \times 100\%$$

$$= \frac{2}{3} \times 20\%$$

$$= \frac{40}{3}\%$$

$$T = \frac{(n-1)}{R} \text{ Years}$$

$$= \frac{(5-1)}{\frac{40}{3}} \times 100$$

$= 30$ years.

7. (3) Let the principal be x.

$\therefore$ Amount $= 2x$

$\therefore$ Interest $= (2x - x) = x$

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{x \times 100}{x \times 12} = \frac{25}{3} = 8\frac{1}{3}\%$$

Aliter : Using Rule 3,

$$R = \frac{(2-1)}{12} \times 100\%$$

$$R = \frac{25}{3}\%$$

$$R = 8\frac{1}{3}\%$$

8. (3) Let the principal be x

$$\therefore \text{ Principal} + \text{SI} = \frac{7x}{4}$$

$$\therefore \text{ SI} = \frac{7x}{4} - x = \frac{3x}{4}$$

$$\text{Rate} = \frac{\text{SI} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{3x \times 100}{4 \times x \times 4} = 18\frac{3}{4}\%$$

Aliter : Using Rule 3,

$$R = \frac{\left(\frac{7}{4} - 1\right)}{4} \times 100\%$$

$$= \frac{3}{16} \times 100\%$$

$$= \frac{75}{4}\%$$

$$R = 18\frac{3}{4}\%$$

9. (4) The sum gets doubled in 5 years and tripled in 12 years. Clearly rate of interest for 12 years will be lower.

Let Principal be x.

then, Rate $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{2x \times 100}{x \times 12} = \dfrac{50}{3} = 16\dfrac{2}{3}\%$

Aliter : Using Rule 3,

$R_1 = \dfrac{(2-1)}{5} \times 100\%$

$= 20\%$

$R_2 = \dfrac{(3-1)}{12} \times 100\%$

$= 16\dfrac{2}{3}\%$

$\Rightarrow$ Lower rate of interest $= 16\dfrac{2}{3}\%$

10. (3) TIme $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{x \times 100}{x \times \dfrac{25}{4}} = 16$ years

Aliter : Using Rule 3,

$T = \dfrac{(n-1)}{R\%}$ years

$= \dfrac{(2-1)}{\dfrac{25}{4}} \times 100$ years

$= 16$ years.

11. (3) If principal be x, interest $= x$ and rate $= r\%$ p.a. then

Rate $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{x \times 100}{x \times 10} = 10\%$

Now, $p = x$, interest $= 2x$

Then, time $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{2x \times 100}{x \times 10} = 20$ years

Aliter : Using Rule 3,

$R = \dfrac{(2-1)}{10} \times 100\%$

R $= 10\%$

$T = \dfrac{(n-1)}{R} \times 100$ years

$= \dfrac{3-1}{10} \times 100$

$= 20$ years.

12. (4) If the principal be x, the amount $= 2x$

$\therefore$ SI $= x$

$\therefore$ Time $= \dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{x \times 100}{x \times 15} = \dfrac{20}{3} = 6\dfrac{2}{3}$ years

Aliter : Using Rule 3,

$T = \dfrac{(n-1)}{R} \times 100\%$

$= \left(\dfrac{2-1}{15}\right) \times 100$

$= \dfrac{100}{15} = \dfrac{20}{3}$ Years

$= 6\dfrac{2}{3}$ years

13. (3) If the principal be ₹ 100 then S.I. = ₹ 100.

$\therefore$ Time $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{100 \times 100}{100 \times 12} = \dfrac{25}{3}$ years

$= 8$ years 4 months

Aliter : Using Rule 3,

$T = \dfrac{(n-1)}{R} \times 100\%$

$= \dfrac{(2-1)}{12} \times 100\%$

$= \dfrac{100}{12} = \dfrac{25}{3}$ years.

$= 8\dfrac{1}{3}$ years

$= 8$ years, 4 months.

14. (2) Principal = Rs. x

Amount = Rs. $2x$

$\therefore$ Interest $= 2x - x$

$=$ Rs. x

$\therefore$ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{x \times 100}{x \times 8} = \dfrac{25}{2}$

$= 12.5$ % per annum

Aliter : Using Rule 3,

R % $= \dfrac{(n-1)}{T} \times 100\%$

$= \dfrac{(2-1)}{8} \times 100\%$

$= 12.5\%$

15. (*) Principal = Rs. x

Interest = Rs. x

Rate $= \dfrac{\text{S.I} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{x \times 100}{x \times 16} = \dfrac{25}{4}$ % per annum

Case II,

Interest $=$ Rs. $2x$

$\therefore$ Time $= \dfrac{\text{S.I} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{2x \times 100 \times 4}{x \times 25} = 32$ years

Aliter : Using Rule 3,

R $= \dfrac{(n-1)}{T} \times 100\%$

$= \dfrac{(2-1)}{16} \times 100\%$

$= \dfrac{25}{4}\%$

$= 6\dfrac{1}{4}\%$

Now, T $= \dfrac{(n-1)}{R} \times 100$

$= \dfrac{(3-1)}{\dfrac{25}{4}} \times 100$

$= \dfrac{800}{25} = 32$ years.

16. (1) According to the question, If principal be Rs. x, then

S.I. = Rs. x

$\therefore$ Time $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{x \times 100}{x \times \dfrac{25}{4}} = \dfrac{400}{25} = 16$ years

Aliter : Using Rule 3,

$$T = \left(\frac{(n-1)}{R}\right) \times 100\%$$

$$= \frac{2-1}{\dfrac{25}{4}} \times 100$$

$$= \frac{400}{25} = 16 \text{ years.}$$

17. (2) Using Rule 1,
Rate = R% per annum

$$\therefore \text{ Time} = \frac{R}{2} \text{ years}$$

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$\Rightarrow R = \frac{8}{25} \times \frac{100}{\dfrac{R}{2}}$$

$$\Rightarrow R^2 = \frac{8 \times 200}{25} = 64$$

$$\Rightarrow R = \sqrt{64} = 8\% \text{ per annum}$$

18. (3) Case I,

Interest = Principal

$$\text{Rate} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{100}{7}\% \text{ per annum}$$

Case II,
Interest = 3 × Principal

$$\text{Time} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{3 \times 100}{\dfrac{100}{7}} = 3 \times 7 = 21 \text{ years}$$

19. (4) Principal = Rs. P and time = T years

$$\therefore \text{ S.I.} = \frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$$

According to the question,

$$\therefore P + \frac{PT \times 5}{100} = 2200$$

$$\Rightarrow P + \frac{PT}{20} = 2200 \quad ....(i)$$

Again, $\dfrac{PT \times 8}{100} - \dfrac{PT \times 5}{100}$

= 2320 – 2200

$$\Rightarrow \frac{3PT}{100} = 120$$

$$\Rightarrow PT = \frac{120 \times 100}{3} = 4000 \text{ ...(ii)}$$

∴ From equation (i),

$$P + \frac{4000}{20} = 2200$$

$$\Rightarrow P = 2200 - 200 = \text{Rs. } 2000$$

∴ From equation (ii),
PT = 4000

$$\Rightarrow T = \frac{4000}{2000} = 2 \text{ years}$$

Alternative Method

Difference in rates
= 8 – 5 = 3%
∵ 3% ≡ 2320 – 2200 = 120

$$\therefore 5\% \equiv \frac{120}{3} \times 5 = 200$$

∴ Principal = Rs. (2200 – 200)
= Rs. 2000

$$\therefore \text{ Time} = \frac{200 \times 100}{2000 \times 5} = 2 \text{ years}$$

20. (2) Let principal be Rs. x.
∴ Amount = Rs. 2x
∴ Interest = Rs. (2x – x)
= Rs. x

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{x \times 100}{x \times 15} = \frac{20}{3}$$

$$= 6\frac{2}{3}\% \text{ per annum}$$

21. (2) Principal = Rs. x
Interest = Rs. x
Time = 6 years

$$\therefore \text{ Rate} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{x \times 100}{x \times 16} = \frac{50}{3}\% \text{ per annum}$$

Case II,

$$\text{Interest} = \frac{x \times 12 \times 50}{100 \times 3} = \text{Rs. } 2x$$

i.e., Amount is thrice the principal.

22. (3) Principal = Rs. x (let)
∴ Amount = Rs. 5x
Interest = Rs. (5x – x) = Rs. 4x

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{4x \times 100}{x \times 8} = 50\% \text{ per annum}$$

23. (4) Let principal be Rs. x.
∴ Amount = Rs. 2x
Interest = Rs. (2x – x) = Rs. x

$$\therefore \text{ Rate} = \frac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{x \times 100}{x \times 8} = \frac{25}{2}$$

$$= 12\frac{1}{2}\% \text{ per annum}$$

24. (3) According to the question,
Principal = Rs. x.
Interest = Rs. x.

$$\text{Time} = \frac{50}{3} \text{ years}$$

$$\therefore \text{ Rate} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Time}}$$

$$= \frac{x \times 100}{x \times \dfrac{50}{3}} = \frac{100 \times 3}{50}$$

= 6% per annum

TYPE-III

1. (3) Let the principal be x

$$\therefore \text{ Interest} = \frac{2}{5}x$$

Rate = 8% per annum

$$\therefore \text{ Time} = \frac{\text{Interest} \times 100}{\text{Principal} \times \text{Rate}}$$

$$= \frac{\dfrac{2}{5}x \times 100}{x \times 8} = \frac{40}{8} = 5 \text{ years}$$

Aliter : Using Rule 5,

Here, $n = \dfrac{2}{5}$ and R = 8%

$$\Rightarrow RT = (n \times 100)$$

$$T = \frac{n \times 100}{R}$$

$$T = \frac{2}{5} \times \frac{100}{8}$$

$$\boxed{T = 5 \text{ years}}$$

2. (2) Let Prinicpal = ₹ 100

S.I. = $100 \times \dfrac{1}{5}$ = ₹ 20

Rate = $\dfrac{20 \times 100}{100 \times 4}$ = 5%

Aliter : Using Rule 5,

Here, $n = \dfrac{1}{5}$, T = 4 years.

R = $\dfrac{n \times 100}{T}$

R = $\dfrac{1}{5} \times \dfrac{100}{4}$

R = 5%

3. (1) Rate = $\dfrac{SI \times 100}{Principal \times Time}$

= $\dfrac{9}{25} \times \dfrac{100}{6}$ = 6% per annum

Aliter : Using Rule 5,

Here, $n = \dfrac{9}{25}$, T = 6 years.

R = $\dfrac{n \times 100}{T}$

R = $\dfrac{9}{25} \times \dfrac{100}{6}$

R = 6%

4. (1) $\dfrac{Simple\ interest}{Principal} = \dfrac{1}{4}$

∴ Rate = $\dfrac{S.I. \times 100}{Principal \times Time}$

= $\dfrac{1 \times 100}{4 \times 5} = 5\%$ per annum

Aliter : Using Rule 5,

Here, $n = \dfrac{1}{4}$, T = 5 years

R = $\dfrac{n \times 100}{T}$

= $\dfrac{1}{4} \times \dfrac{100}{5}$ = R = 5%

5. (2) $\dfrac{Interest}{Principal} = \dfrac{3}{8}$

∴ Rate = $\dfrac{S.I. \times 100}{Principal \times Time}$

= $\dfrac{3}{8} \times \dfrac{\frac{100}{25}}{4}$

= $\dfrac{3}{8} \times \dfrac{400}{25}$ = 6% per annum

Aliter : Using Rule 5,

Here, $n = \dfrac{3}{8}$, T = $\dfrac{25}{4}$ years.

R = $\dfrac{n \times 100}{T}$

= $\dfrac{3}{8} \times \dfrac{\frac{100}{25}}{4}$

R = 6%

6. (2) Using Rule 1,

S.I. = $\dfrac{Principal \times Time \times Rate}{100}$

∴ $1200 + \dfrac{1200 \times 7 \times r}{12 \times 100}$

= Amount (A)

⇒ 1200 + 7r = A ....(i)

and, $1016 + \dfrac{1016 \times 5 \times r}{2 \times 100}$ = A

∴ 1016 + 25.4r = A ...(ii)

∴ 1016 + 25.4r = 1200 + 7r

⇒ 25.4r – 7r = 1200 – 1016

⇒ 18.4r = 184 ⇒ r = $\dfrac{184}{18.4}$

= 10% per annum

7. (2) Amount after 10 years

= $P\left(1 + \dfrac{RT}{100}\right) = P\left(1 + \dfrac{R \times 10}{100}\right)$

= Rs. $P\left(1 + \dfrac{R}{10}\right)$

∴ Interest = Rs. $P\left(1 + \dfrac{R}{10}\right) \times \dfrac{2}{5}$

∴ Rate = $\dfrac{S.I \times 100}{Principal \times Time}$

⇒ R = $\dfrac{P\left(1 + \dfrac{R}{10}\right) \times \dfrac{2}{5} \times 100}{P \times 10}$

⇒ R = $4\left(1 + \dfrac{R}{10}\right)$

⇒ $\dfrac{R}{4} = 1 + \dfrac{R}{10}$

⇒ $\dfrac{R}{4} - \dfrac{R}{10} = 1$

⇒ $\dfrac{5R - 2R}{20} = 1$

⇒ 3R = 20

⇒ R = $\dfrac{20}{3} = 6\dfrac{2}{3}$ %

Aliter : Using Rule 5,

Here, S.I. = $\dfrac{2}{5}$ amount

S.I. = $\dfrac{2}{5}$ (P + S.I.)

⇒ S.I. = $\dfrac{2}{5}$ S.I. + $\dfrac{2}{5}$ P

⇒ $\dfrac{3}{5}$ S.I. = $\dfrac{2}{5}$ P

S.I. = $\dfrac{2}{3}$ P

Now, n = $\dfrac{2}{3}$, T = 10 years.

⇒ R = $\dfrac{n \times 100}{T}$

= $\dfrac{2}{3} \times \dfrac{100}{10}$

= $\dfrac{20}{3} = 6\dfrac{2}{3}\%$

8. (3) Rate of interest
= r % per annum

S.I. = $\dfrac{Principal \times Time \times Rate}{100}$

According to the question,

$\dfrac{3200 \times 5 \times r}{100 \times 2} - \dfrac{3000 \times 5 \times r}{200} = 40$

⇒ 80r – 75r = 40

⇒ 5r = 40 ⇒ r = $\dfrac{40}{5}$

= 8% per annum

Aliter : Using Rule 13,
Here, P_1 = Rs. 3000, R_1

= R, $T_1 = \dfrac{5}{2}$ years

P_2 = Rs. 3200,

$R_2 = R$, $T_2 = \dfrac{5}{2}$ years

Difference S.I. = Rs. 40

$\Rightarrow$ 40 =

$\dfrac{3200 \times R \times \dfrac{5}{2} - 3000 \times R \times \dfrac{5}{2}}{100}$

4000 = 8000 R – 7500 R

R = 8%

TYPE-IV

1. (4) According to question,

Interest of one year = ₹ 42

Rate = 5% and Time = 1 year

$\therefore$ Principal $= \dfrac{\text{Interest} \times 100}{\text{Rate} \times \text{Time}}$

$= \dfrac{42 \times 100}{5 \times 1} = $ ₹ 840

Aliter : Using Rule 13,

$P_1 = P$, $R_1 = 5\%$, $T_1 = 3$years.

$P_2 = P$, $R_2 = 5\%$, $T_2 = 4$ years.

S.I.= 42

$42 = \dfrac{20P - 15P}{100}$

$P = 42 \times 20$

$P = $ ₹ 840

2. (3) Let r_1, and r_2 be the required rate of interest

Then,

$13.50 = \dfrac{1500 \times 3 \times r_1}{100}$

$\qquad\qquad - \dfrac{1500 \times 3 \times r_2}{100}$

$= \dfrac{4500}{100}\left(r_1 - r_2\right)$

$r_1 - r_2 = \dfrac{135}{450} = \dfrac{27}{90}$

$= \dfrac{3}{10} = 0.3\%$

Aliter : Using Rule 13,

$P_1 = $ Rs. 1500, R_1, $T_1 = 3$ years.

$P_2 = $ Rs. 1500, R_2, $T_2 = 3$ years.

S.I. = Rs. 13.50

13.50

$= \dfrac{1500 \times R_2 \times 3 - 1500 \times R_1 \times 3}{100}$

$\dfrac{1350}{100} = \dfrac{4500\left(R_2 - R_1\right)}{100}$

$R_2 - R_1 = \dfrac{1350}{4500} = \dfrac{27}{90}$

$= \dfrac{3}{10} = 0.3\%$

3. (2) Using Rule 1,

We know that

S.I. $= \dfrac{PRT}{100}$

According to question,

S.I.$= \dfrac{4}{9}P$

& R = T (numerically)

$\therefore \dfrac{4}{9}P = \dfrac{P \times R \times R}{100}$

$\therefore R^2 = \dfrac{400}{9}$

$R = \sqrt{\dfrac{400}{9}} = \dfrac{20}{3} = 6\dfrac{2}{3}\%$

4. (4) Let the sum be x

$\dfrac{x \times 5 \times 15}{100 \times 12} - \dfrac{x \times 4 \times 8}{100 \times 12} = 129$

$\Rightarrow \dfrac{x}{100 \times 12}\left(75 - 32\right) = 129$

$\Rightarrow x = \dfrac{129 \times 1200}{43} = $ ₹ 3600

Aliter : Using Rule 13,

$P_1 = P$, $R_1 = 4\%$, T_1

$= 8$ months $= \dfrac{8}{12}$ years

$P_2 = P$, $R_2 = 5\%$, T_2

$= 15$ month $= \dfrac{15}{12}$ years

S.I. = ₹ 129

$129 = \dfrac{P \times 5 \times \dfrac{15}{12} - P \times \dfrac{4 \times 8}{12}}{100}$

$12900 = \dfrac{75P - 32P}{12}$

$12900 = \dfrac{43P}{12}$

P = ₹ 3600

5. (4) Using Rule 1,

Let the sum lent in each case be x.

Then,

$\dfrac{x \times 9 \times 2}{100} + \dfrac{x \times 10 \times 2}{100} = 760$

$\dfrac{x \times 2}{100}(9 + 10) = 760$

$\Rightarrow \dfrac{2 \times 19x}{100} = 760$

$\Rightarrow x = \dfrac{760 \times 100}{2 \times 19} = $ ₹ 2000

6. (1) Let the rate of interest be r% and principal be P.

According to the question.

$\dfrac{16P}{25} = \dfrac{P \times r \times r}{100}$

[$\because$ r = t numerically]

$\Rightarrow r^2 = \dfrac{1600}{25}$

$\Rightarrow r = \dfrac{40}{5} = 8\%$

Aliter : Using Rule 5,

Here, $n = \dfrac{16}{25}$, R = T

Now $R \times R = \dfrac{16}{25} \times 100$

$R^2 = \dfrac{1600}{25}$

$R = \sqrt{\dfrac{1600}{25}}$

$R = \dfrac{40}{5}$

$R = 8\%$

7. (3) Using Rule 1,

Let the sum lent out at 12.5% be x

$\therefore$ Sum lent out at 10%

$= 1500 - x$

Now, $\dfrac{(1500 - x) \times 10 \times 5}{100}$

$= \dfrac{x \times 12.5 \times 4}{100}$

$\Rightarrow 50(1500 - x) = 50x$

$\Rightarrow 2x = 1500$

$\Rightarrow x = \dfrac{1500}{2} = ₹\ 750$

8. (1) Let the principal be P and rate of interest be r %

According to the question,

$\dfrac{30P}{100} = \dfrac{P \times R \times 6}{100}$

$\Rightarrow 30 = 6\ R$

$\Rightarrow R = 5$

Now, let interest be equal to principal in T years.

$\therefore P = \dfrac{P \times 5 \times T}{100}$

$\Rightarrow T = \dfrac{100}{5} = 20$ years.

Aliter : Using Rule 5,

Here, $n = \dfrac{30}{100} = \dfrac{3}{10}$, T = 6 years.

$\Rightarrow \quad RT = n \times 100$

$R \times 6 = \dfrac{3}{10} \times 100$

$R = 5\%$

As, S.I. = P

$\Rightarrow \quad$ S.I. $= \dfrac{P \times R \times T}{100}$

$100 = RT$

$100 = 5 \times T$

This is possible only when T = 20.

9. (3) Using Rule 1,

Let the period of time be T years. Then,

$\dfrac{400 \times 5 \times T}{100} = \dfrac{500 \times 4 \times 6.25}{100}$

$\Rightarrow T = \dfrac{500 \times 4 \times 6.25}{400 \times 5} = \dfrac{25}{4}$

$= 6\dfrac{1}{4}$ years

10. (2) Let the annual rate of interest = r%

Time = r years

Let the principal be x .

$\therefore$ Interest $= \dfrac{x}{16}$

According to the question,

$\dfrac{x}{16} = \dfrac{x \times r \times r}{100}$ [$\because$ r = t]

$\Rightarrow 16r^2 = 100$

$\Rightarrow r^2 = \dfrac{100}{16} = \dfrac{25}{4}$

$\therefore$ r $= \sqrt{\dfrac{25}{4}} = \dfrac{5}{2} = 2\dfrac{1}{2}\%$

Aliter : Using Rule 5,

Here, $n = \dfrac{1}{16}$, R = T

$RT = n \times 100$

$R^2 = \dfrac{100}{16}$

$R = \sqrt{\dfrac{100}{16}}$

$R = \dfrac{10}{4}$

$R = 2\dfrac{1}{2}\%$

11. (1) Using Rule 1,

Let the larger part of the sum be x

$\therefore$ Smaller part = ₹ $(12000 - x)$

According to the question,

$\dfrac{x \times 3 \times 12}{100} = \dfrac{(12000 - x) \times 9 \times 16}{2 \times 100}$

$\Rightarrow 36\ x = (12000 - x)\ 72$

$\Rightarrow x = (12000 - x) \times 2$

$\Rightarrow x + 2x = 24000$

$\Rightarrow 3x = 24000$

$\Rightarrow x = \dfrac{24000}{3} = ₹\ 8000$

12. (2) Let the principal be x and rate be y% per annum.

According to the question,

$\therefore$ SI $= \dfrac{P \times R \times T}{100}$

$\Rightarrow \dfrac{x}{4} = \dfrac{x \times y \times y}{100}$

$\Rightarrow y^2 = \dfrac{100}{4} = 25$

$\Rightarrow y = \sqrt{25} = 5\%$ per annum

Aliter : Using Rule 5,

$n = \dfrac{1}{5}$, R = T

$RT = n \times 100$

$R^2 = \dfrac{1}{4} \times 100$

$R^2 = 25$

$R = 5\%$

13. (3) Let the sum lent be x.

$\therefore \dfrac{x \times 7.5 \times 5}{100} - \dfrac{x \times 7.5 \times 4}{100} = 150$

$\Rightarrow \dfrac{x \times 7.5 \times 1}{100} = 150$

$\Rightarrow x = \dfrac{150 \times 100}{7.5} = ₹\ 2000$

Aliter : Using Rule 13,

Here, $P_1 = P$, $R_1 = 7.5\%$,
$T_1 = 4$ years.

$P_2 = P$, $R_2 = 7.5\%$, $T_2 = 5$ years.

S.I. = Rs. 150

S.I. $= \dfrac{P_2 R_2 T_2 - P_1 R_1 T_1}{100}$

$150 = \dfrac{P \times 7.5 \times 5 - P \times 7.5 \times 4}{100}$

$15000 = 7.5P$

$P = \dfrac{15000}{7.5}$

$P = \dfrac{150000}{75}$

$P = ₹\ 2000$

14. (1) Using Rule 1,

Let first part be x and second part be $(1750 - x)$

According to the question,

$x \times \dfrac{8}{100} = (1750 - x) \times \dfrac{6}{100}$

$\Rightarrow 8x + 6x = 1750 \times 6$

$\Rightarrow 14x = 1750 \times 6$

$\Rightarrow x = \dfrac{1750 \times 6}{14} = ₹\ 750$

$\therefore$ Interest = 8% of 750

$= 750 \times \dfrac{8}{100} = ₹\ 60$

15. (3) Using Rule 1,

Let the period of time be T years.

$\therefore 800 + \dfrac{800 \times 12 \times T}{100}$

$= 910 + \dfrac{910 \times 10 \times T}{100}$

$\Rightarrow 800 + 96\ T = 910 + 91T$

$\Rightarrow 96\ T - 91\ T = 910 - 800$

$\Rightarrow 5T = 110$

$\Rightarrow T = \dfrac{110}{5} = 22$ years.

16. (3) $\dfrac{\text{Simple interest}}{\text{Principal}} = \dfrac{1}{9}$

If the annual rate of interest be r%, then

Rate = $\dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$\Rightarrow r = \dfrac{1}{9} \times \dfrac{100}{r}$

$\Rightarrow r^2 = \dfrac{100}{9}$

$\Rightarrow r = \sqrt{\dfrac{100}{9}} = \dfrac{10}{3} = 3\dfrac{1}{3}\%$

Aliter : Using Rule 5,

Here, $n = \dfrac{1}{9}$, R = T

RT = n × 100

$R^2 = \dfrac{1}{9} \times 100$

$R^2 = \dfrac{100}{9}$

$R = \sqrt{\dfrac{100}{9}}$

$R = \dfrac{10}{3}$

$R = 3\dfrac{1}{3}\%$

17. (2) 411, Using Rule 1,
Let 'r' be the rate of interest

$190 = \dfrac{500 \times 4 \times r}{100} + \dfrac{600 \times 3 \times r}{100}$

$\Rightarrow 20r + 18r = 190$

$\Rightarrow 38r = 190$

$\Rightarrow r = \dfrac{190}{38} = 5\%$

18. (2) $\dfrac{500 \times 2 \times R_1}{100} - \dfrac{500 \times 2 \times R_2}{100}$

= 2.5, where R_1 & R_2 are rate% of both banks

$\Rightarrow 10(R_1 - R_2) = 2.5$

$\Rightarrow R_1 - R_2 = \dfrac{2.5}{10}$

= 0.25 % per annum

Aliter : Using Rule 7,

Here, P = Rs. 500, x = Rs. 2.50,
Difference in time = 2 years.
Difference in rate = ?

$500 = \dfrac{2.50 \times 100}{(\text{diff. in rate}) \times 2}$

Different in rate = 0.25%

19. (3) Using Rule 1,
Let the principal be x.

Time = $\dfrac{\text{SI} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{x \times 100 \times 3}{x \times 50}$ = 6 years

20. (2) Using Rule 1,

$\dfrac{P \times r \times 1}{100} = \dfrac{P \times 5 \times 2}{100}$

[∵ Capital is same in both cases]
r × 1 = 5 × 2
$\Rightarrow$ r = 10%

21. (1) Using Rule 1,

S.I. $= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\therefore \dfrac{4000 \times 3 \times x}{100}$

$= \dfrac{5000 \times 2 \times 12}{100}$

$\Rightarrow x = \dfrac{5 \times 2 \times 12}{4 \times 3}$

= 10% per annum

22. (4) Using Rule 1,

S.I. $= \dfrac{P \times R \times T}{100}$

$\therefore y = \dfrac{x \times T \times R}{100}$

and $z = \dfrac{y \times T \times R}{100}$

So, $\dfrac{y}{z} = \dfrac{x}{y} \Rightarrow y^2 = zx$

23. (1) Using Rule 1,
Amount lent at 8% rate of interest = ₹ x

$\therefore$ Amount lent at $\dfrac{4}{3}\%$ rate of interest = ₹ $(20,000 - x)$

$\therefore$ S.I. $= \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

$\therefore \dfrac{x \times 8 \times 1}{100} + \dfrac{(20,000 - x) \times \frac{4}{3} \times 1}{100}$

= 800

$\Rightarrow \dfrac{2x}{25} + \dfrac{20,000 - x}{75} = 800$

$\Rightarrow \dfrac{6x + 20,000 - x}{75} = 800$

$\Rightarrow 5x + 20,000 = 75 \times 800$
= 60,000

$\Rightarrow 5x = 60,000 - 20,000 = 40,000$

$\Rightarrow x = \dfrac{40,000}{5} = ₹\ 8000$

24. (3) Let amount invested in each company be Rs. x.

S.I. $= \dfrac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$

According to the question,

$\dfrac{x \times 15 \times 5}{100} - \dfrac{x \times 12 \times 4}{100}$

= 1350

$\Rightarrow \dfrac{75x}{100} - \dfrac{48x}{100}$ = 1350

$\Rightarrow \dfrac{27x}{100}$ = 1350

$\Rightarrow x = \dfrac{1350 \times 100}{27}$ = Rs. 5000

Aliter : Using Rule 13.
Here, P_1 = Rs. P, R_1 = 12%,
$\quad\quad T_1$ = 4 years
P_2 = Rs. P, R_2 = 15%,
T_2 = 5 years
S.I. = Rs. 1350

S.I.$= \dfrac{P_2 \times R_2 \times T_2 - P_1 \times R_1 \times T_1}{100}$

$1350 = \dfrac{P \times 15 \times 5 - P \times 12 \times 4}{100}$

135000 = 75 P – 48P
135000 = 75 P
$\Rightarrow$ P = Rs. 5000

25. (3) Using Rule 1,
True discount

$= \dfrac{\text{Amount} \times \text{Rate} \times \text{Time}}{100 + (\text{Rate} \times \text{Time})}$

$= \dfrac{2400 \times 5 \times 4}{100 + (5 \times 4)}$

$= \dfrac{2400 \times 5 \times 4}{120}$ = Rs. 400

S.I. = $\dfrac{2400 \times 5 \times 4}{100}$ = Rs. 480

Required difference
= Rs. (480 – 400) = Rs. 80

TYPE-V

1. (4) Using Rule 1,
Let the sum lent at the rate of interest 5% per annum is x and at the rate of interest 8% per annum is (1550 – x)
According to the question,

$\dfrac{x \times 5 \times 3}{100} + \dfrac{(1550 - x) \times 8 \times 3}{100} = 300$

$\Rightarrow \dfrac{15x}{100} + \dfrac{37200 - 24x}{100} = 300$

$\Rightarrow$ 15x + 37200 – 24x = 300 × 100
$\Rightarrow$ 9x = 7200
$\therefore$ x = ₹ 800 and,
1550 – x = 1550 – 800 = ₹ 750
$\therefore$ Ratio of money lent at 5% to that at 8% = 800 : 750 = 16 : 15

2. (2) Using Rule 1,
Let the sum of x be lent at the rate of 4% and (5000 – x) at the rate of 5%

$\therefore \dfrac{x \times 4 \times 2}{100} + \dfrac{(5000 - x) \times 5 \times 2}{100} = 440$

$\Rightarrow$ 8x + 50000 – 10x = 44000
$\Rightarrow$ 2x = 50000 – 44000 = 6000
$\Rightarrow$ x = ₹ 3000
$\therefore$ ₹ (5000 – x)
= ₹ (5000 – 3000) = ₹ 2000
Now, Required ratio
= 3000 : 2000 = 3 : 2

3. (4) Required ratio = $5 : \dfrac{2}{5}$ = 25 : 2

$\dfrac{\text{loan amount}}{\text{Interest amount}} = \dfrac{5}{2}$

$\Rightarrow$ Interest rate = $\dfrac{2}{5}$

$\left[\because \dfrac{P + I}{I} = \dfrac{5}{2} \Rightarrow \dfrac{P}{I} + 1 = \dfrac{5}{2} \right.$

$\left. \Rightarrow \dfrac{P}{I} = \dfrac{3}{2}, \text{then } I = \dfrac{2}{5} \right]$

$\dfrac{\text{loan amount}}{\text{Interest rate}} = \dfrac{5}{2/5}$

$= \dfrac{25}{2}$ or 25:2

4. (1) Using Rule 1,

$P_1 : P_2 : P_3 = \dfrac{1}{r_1 t_1} : \dfrac{1}{r_2 t_2} : \dfrac{1}{r_3 t_3}$

$= \dfrac{1}{6 \times 10} : \dfrac{1}{10 \times 12} : \dfrac{1}{12 \times 15}$

$= \dfrac{1}{60} : \dfrac{1}{120} : \dfrac{1}{180}$

= 6 : 3 : 2

5. (3) Using Rule 1,
Case-I,
Interest = $5x - 4x = x$

$\therefore x = \dfrac{4x \times R \times T}{100}$

$\Rightarrow T = \dfrac{25}{R}$ years

Case-II,

$T = \dfrac{25}{R} + 3 = \left(\dfrac{25 + 3R}{R} \right)$ years

SI = $7y - 5y = 2y$

$\therefore 2y = \dfrac{5y \times R \times (25 + 3R)}{R \times 100}$

$\Rightarrow$ 40 = 25 + 3R
$\Rightarrow$ 3R = 40 –25 = 15 %

$\Rightarrow R = \dfrac{15}{3} = 5\%$

6. (4) Using Rule 1,

$\dfrac{\text{Principal}}{\text{Amount}} = \dfrac{10}{12}$

$\dfrac{\text{Amount}}{\text{Principal}} = \dfrac{\text{Principal} + \text{interest}}{\text{Principal}}$

$= \dfrac{12}{10}$

$\Rightarrow 1 + \dfrac{\text{Interest}}{\text{Principal}} = \dfrac{12}{10}$

$\Rightarrow \dfrac{\text{Interest}}{\text{Principal}} = \dfrac{2}{10} = \dfrac{1}{5}$

$\therefore$ Rate = $\dfrac{1}{5} \times 100 = 20\%$

7. (2) Using Rule 1,

Time = $\dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Rate}}$

$= \dfrac{3}{10} \times \dfrac{100}{10} = 3$ years

8. (1) Using Rule 1,
First part = Rs. x and second part = (12000 – x)

$\therefore \dfrac{x \times 3 \times 12}{100}$

$= \dfrac{(12000 - x) \times 9 \times 16}{200}$

$\Rightarrow \dfrac{x}{12000 - x}$

$= \dfrac{9 \times 16 \times 100}{3 \times 12 \times 200} = \dfrac{2}{1} = 2 : 1$

9. (1) Using Rule 1,
Principal : Interest = 25 : 1
$\Rightarrow$ Interest : Principal = 1 : 25

$\therefore$ Rate = $\dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{1}{25} \times 100 = 4\%$ per annum

10. (2) Using Rule 1,

$\dfrac{\text{Principal}}{\text{Interest}} = \dfrac{10}{3}$

$\Rightarrow \dfrac{\text{Interest}}{\text{Principal}} = \dfrac{3}{10}$

$\therefore$ Rate = $\dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{3}{10} \times \dfrac{100}{5} = 6\%$ per annum

11. (3) Principal lent at 8% S.I.
= Rs. x.
$\therefore$ Principal lent at 10% S.I.
= Rs. (4000 – x)

S.I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\therefore \dfrac{x \times 8}{100} + \dfrac{(4000 - x) \times 10}{100}$

= 352
$\Rightarrow$ 8x + 40000 – 10x = 35200
$\Rightarrow$ 2x = 40000 – 35200 = 4800

$\Rightarrow x = \dfrac{4800}{2}$ = Rs. 2400

TYPE-VI

1. (3) Using Rule 1,
Interest = ₹. (480–400) = ₹ 80

$\therefore \quad 80 = \dfrac{400 \times r \times 4}{100} \Rightarrow r = 5$

Now, $r = 7\%$ (2% increase)

$\therefore$ S.I. $= \dfrac{400 \times 7 \times 4}{100} = 112$

$\therefore$ Amount $= ₹ (400+112) = ₹ 512$

2. (1) Using Rule 1,
Let his capital be x.
According to the question,

$\dfrac{x \times 11.5}{100} - \dfrac{x \times 10}{100} = 55.50$

or $(11.5 - 10)x = 5550$

or $1.5x = 5550$

or $x = \dfrac{5550}{1.5} = ₹ 3700$

3. (1) Using Rule 1,
Change in SI

$= \left(\dfrac{25}{2} - 10\right)\% = \dfrac{5}{2}\%$

$\therefore \dfrac{5}{2}\%$ of principal $= ₹ 1250$

$\therefore$ Principal

$= ₹ \dfrac{1250 \times 2 \times 100}{5} = ₹ 50000$

4. (1) Let the sum = P and original rate = R% per annum.
Then,

$\dfrac{P \times (R + 3) \times 2}{100} - \dfrac{P \times R \times 2}{100} = 72$

$\Rightarrow \dfrac{P \times 3 \times 2}{100} = 72$

$\Rightarrow P = \dfrac{72 \times 100}{3 \times 2} = ₹ 1200$

Aliter : Using Rule 13,
$P_1 = P, R_1 = R, T_1 = 2$
$P_2 = P, R_2 = R + 3, T_2 = 2$
S.I.= 72

$72 = \dfrac{P \times (R + 3) \times 2 - P \times R \times 2}{100}$

$7200 = 6P$
$P = ₹ 1200$

5. (4) If the sum lent be Rs. x, then

$\dfrac{x \times 2.5 \times 3}{100} = 540$

$\Rightarrow x = \dfrac{540 \times 100}{2.5 \times 3} = ₹ 7200$

Aliter : Using Rule 13,
$P_1 = P, R_1 = R, T_1 = 3$
$P_2 = P, R_2 = R + 2.5\% \ T_2 = 3$
S.I. = Rs. 540

$540 = \dfrac{P \times (R + 2.5\%) \times 3 - P \times R \times 3}{100}$

$54000 = 7.5P$

$P = \dfrac{540000}{75}$

$P = ₹ 7200$

6. (1) $\dfrac{P \times 1 \times 2}{100} = 24$

$\Rightarrow P = \dfrac{2400}{2} = ₹ 1200$

Aliter : Using Rule 13,
$P_1 = P, R_1 = R, T_1 = 2.$
$P_2 = P, R_2 = R + 1, T_2 = 2$
S.I.= Rs. 24

$24 = \dfrac{P(R + 1)2 - PR2}{100}$

$2400 = 2PR + 2P - 2PR$
$P = ₹ 1200$

7. (3) If the capital after tax deduction be x, then
$x \times (4 - 3.75) \% = 48$

$\Rightarrow \dfrac{x \times 0.25}{100} = 48$

$\Rightarrow \dfrac{x \times 25}{10000} = 48$

$\Rightarrow \dfrac{x}{400} = 48$

$\Rightarrow x = 48 \times 400 = ₹ 19200$

$\therefore$ Required capital

$= \dfrac{19200 \times 100}{96} = ₹ 20000$

8. (1) If the principal be x, then

$\dfrac{x \times 3 \times 2}{100} = 300$

$\Rightarrow x = \dfrac{300 \times 100}{3 \times 2} = ₹ 5000$

Aliter : Using Rule 13.
$P_1 = P, R_1 = R, T_1 = 2.$
$P_2 = P, R_2 = R + 3, T_2 = 2.$
S.I.= ₹ 300

$300 = \dfrac{P \times (R + 3) \times 2 - PR2}{100}$

$300 = \dfrac{6P}{100}$

$P = ₹ 5000$

9. (4) Using Rule 1,
S.I. $= 3264 - 2400 = ₹ 864$

Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{864 \times 100}{2400 \times 4} = 9\%$ per annum

New rate $= 10\%$ per annum

$\therefore$ S.I. $= \dfrac{2400 \times 10 \times 4}{100} = ₹ 960$

$\therefore$ Amount $= 2400 + 960$
$= ₹ 3360$

10. (4) Using Rule 1,
S.I. $= ₹ (920 - 800) = ₹ 120$

$\therefore$ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{120 \times 100}{800 \times 3}$

$= 5\%$ per annum
New rate $= 8\%$ per annum

$\therefore$ S.I. $= \dfrac{800 \times 3 \times 8}{100} = ₹ 192$

$\therefore$ Amount $= (800 + 192) = ₹ 992$

11. (1) Using Rule 1,
Case I,
S.I. $= 920 - 800 = ₹ 120$

Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{120 \times 100}{800 \times 3} = 5\%$ per annum

Case II,
Rate $= 8\%$ per annum

S.I. $= \dfrac{800 \times 8 \times 3}{100} = ₹ 192$

$\therefore$ Amount $=$ Principal + S.I.
$= (800 + 192) = ₹ 992$

12. (1) Using Rule 1,
S.I. $= 2352 - 2100 = ₹ 252$

Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{252 \times 100}{2100 \times 2} = 6\%$ per annum

New rate = 5%

$\therefore$ S.I. $= \dfrac{252 \times 5}{6} = ₹\ 210$

13. (3) Using Rule 1,
S.I. = 956 – 800 = Rs. 156

$\therefore$ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{156 \times 100}{800 \times 3} = 6.5\%$

New rate = (6.5 + 4)%
= 10.5%

$\therefore$ S.I. $= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \dfrac{800 \times 3 \times 10.5}{100} = $ Rs. 252

$\therefore$ Amount = Rs.(800 + 252)
= Rs.1052

14. (4) Using Rule 1,
Amount deposited in bank = Rs.
x (let)

Difference of rates $= 5 - \dfrac{7}{2}$

$= \dfrac{3}{2}\%$ per annum

$\therefore$ S.I.

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\Rightarrow \dfrac{x \times 1 \times 3}{100 \times 2} = 105$

$\Rightarrow x = \dfrac{105 \times 200}{3} = $ Rs. 7000

TYPE-VII

1. (1) Using Rule 1,
Let x be lent at 8%, then (10000 – x) is lent at 10%.
Accordingly,

$\dfrac{10000 \times 9.2 \times t}{100} = \dfrac{x \times 8 \times t}{100}$

$+ \dfrac{(10000 - x) \times 10 \times t}{100}$

$\Rightarrow \dfrac{92000t}{100} = \dfrac{8xt}{100} + \dfrac{(10000 - x)10t}{100}$

$\Rightarrow 92000t = 8xt + (10000 - x) 10t$

$\Rightarrow 92000 = 8x + 100000 - 10x$
$\Rightarrow 2x = 8000$
$\Rightarrow x = 4000$
$\therefore$ First part = ₹ 4000
Second part = ₹. 6000

2. (1) Let x be lent on 8%.
$\therefore$ (1000 – x) is lent on 10%.
Interest = 9.2% of 1000 = ₹ 92

$\therefore 92 = \dfrac{x \times 8}{100} + \left(\dfrac{1000 - x}{100}\right) \times 10$

$\Rightarrow 8x + 10000 - 10x = 9200$
$\Rightarrow -2x = 9200 - 10000$

$\Rightarrow x = \dfrac{800}{2} = ₹\ 400 = $ first part

$\therefore$ Second part = ₹ 600

3. (1) Interest
= (7000 + 630 × 8) – 12000
= (7000 + 5040) – 12000
= 12040 – 12000 = ₹ 40
Total Principal
= 5000 + 4370 + 3740 + 3110
+ 2480 + 1850 + 1220 + 590
= ₹ 22360

Rate $= \dfrac{40 \times 100 \times 12}{22360 \times 1} \approx 2.1$ per cent

4. (4) Let the sum be ₹ 100.
For initial six months, Interest

$= 100 \times \dfrac{6}{100} \times \dfrac{6}{12} = 3\%$

Now, sum = 100 + 3 = ₹ 103
For another six months,
Interest

$= 103 \times \dfrac{6}{100} \times \dfrac{6}{12} = 3.09$

$\therefore$ Rate of interest per annum
= 3 + 3.09 = 6.09%

5. (3) Let the person have ₹ 100.
Then SI for 1 year

$= ₹ \left(\dfrac{40 \times 15 \times 1}{100} + \dfrac{30 \times 10 \times 1}{100} + \dfrac{30 \times 18 \times 1}{100}\right)$

= ₹ (6 + 3 + 5.4) = ₹ 14.4
$\therefore$ Rate of interest on whole sum
= 14.4%

6. (4) SI earned after two years

$= \dfrac{15600 \times 10 \times 2}{100} = ₹\ 3120$

$\therefore$ Principal for next two years
= ₹ (15600 + 3120)

= ₹ 18720
SI earned at the end of fourth

year $= \dfrac{18720 \times 10 \times 1}{100} = ₹\ 1872$

7. (1) Let x be lent at 10% per annum.
$\therefore$ (1500 – x) is lent at 7% per annum.
Now,

$\dfrac{x \times 10 \times 3}{100} + \dfrac{(1500 - x) \times 7 \times 3}{100} = 396$

$\Rightarrow 30x + 31500 - 21x$
= 39600
$\Rightarrow 9x = 39600 - 31500$

$\Rightarrow x = \dfrac{8100}{9} = ₹\ 900$

8. (2) Let each instalment be x.
Then,

$\left(x + \dfrac{x \times 4 \times 1}{100}\right) + \left(x + \dfrac{x \times 4 \times 2}{100}\right)$

$+ \left(x + \dfrac{x \times 4 \times 3}{100}\right) + x = 848$

$\Rightarrow \left(x + \dfrac{x}{25}\right) + \left(x + \dfrac{2x}{25}\right) + \left(x + \dfrac{3x}{25}\right) + x$

= 848

$\Rightarrow \dfrac{26x}{25} + \dfrac{27x}{25} + \dfrac{28x}{25} + x = 848$

$\Rightarrow \dfrac{26x + 27x + 28x + 25x}{25} = 848$

$\Rightarrow 106x = 848 \times 25$

$\Rightarrow x = \dfrac{848 \times 25}{106} = ₹\ 200$

Aliter : Using Rule 10,
Here, A = ₹ 848,
T = 4 years, r = 4%
Equal instalment

$= \dfrac{848 \times 200}{4\left[200 + (4-1)4\right]}$

$= \dfrac{848 \times 200}{4 \times 212} = ₹\ 200$

9. (3) Using Rule 1.
Remaining amount
= ₹ (50000 – (8000 + 24000))
= ₹18000
Let ₹ 18000 be lent at the rate of
r% p.a.
According to the question,

$$\frac{8000 \times 11 \times 1}{2 \times 100} + \frac{24000 \times 6 \times 1}{100}$$

$$+ \frac{18000 \times r \times 1}{100} = 3680$$

$\Rightarrow 440 + 1440 + 180r = 3680$

$\Rightarrow 1880 + 180r = 3680$

$\Rightarrow 180r = 3680 - 1880 = 1800$

$\Rightarrow r = \dfrac{1800}{180} = 10\%$

10. (2) Using Rule 1.

Let the principal be x.

$\therefore \ I_1 = \dfrac{x \times 10 \times 1}{2 \times 100} = \dfrac{x}{20}$

$I_2 = \dfrac{x \times 9 \times 1}{3 \times 100} = \dfrac{3x}{20}$

$I_3 = \dfrac{x}{6} \times \dfrac{12 \times 1}{100} = \dfrac{x}{50}$

$\therefore \ I_1 + I_2 + I_3$

$= \left(\dfrac{x}{20} + \dfrac{3x}{100} + \dfrac{x}{50} \right)$

$= \left(\dfrac{5x + 3x + 2x}{100} \right) = \dfrac{x}{10}$

$\therefore$ Average annual rate = 10%

11. (3) Using Rule 1.

If the principal be x, then

Simple interest = $(770 - x)$

$\therefore \ $ Principal $= \dfrac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$\Rightarrow x = \dfrac{(770 - x) \times 100}{4 \times 10}$

$\Rightarrow 2x = (770 - x) \times 5$

$\Rightarrow 2x + 5x = 770 \times 5$

$\Rightarrow 7x = 770 \times 5$

$\therefore \ x = \dfrac{770 \times 5}{7} = ₹ \ 550$

12. (4) Using Rule 1.

S.I. on ₹ 12000

$= \dfrac{12000 \times 8 \times 1}{100} = ₹ \ 960$

Desired gain on ₹ 20000

$= 20000 \times \dfrac{10}{100} = ₹ \ 2000$

$\therefore$ S.I. on ₹ 8000 = 2000 – 960

$= ₹ \ 1040$

$\therefore \ $ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{1040 \times 100}{8000}$

= 13% per annum

13. (2) Using Rule 1.

S.I. after five years

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \dfrac{12000 \times 5 \times 10}{100} = ₹ \ 6000$

Interest earned

$= ₹ — (6000 - 3320) = ₹ \ 2680$

$\therefore \ $ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{2680 \times 100}{12000 \times 3} = \dfrac{67}{9} = 7\dfrac{4}{9}\%$

14. (4) Using Rule 1.

Case I

Let principal be x then Amount

$= 3x$

S.I. = $2x$

$\therefore \ $ Rate $= \dfrac{\text{S.I.} \times 100}{\text{Principal} \times \text{Time}}$

$= \dfrac{2x \times 100}{x \times 8} = 25\%$

Case II

Time $= \dfrac{\text{S.I.} \times 100}{\text{Principle} \times \text{Rate}}$

$= \dfrac{3x \times 100}{x \times 25} = 12$ years

15. (2) Using Rule 1.

Required percent

$= \dfrac{1}{4} \times 3 + \dfrac{2}{3} \times 5 + \left(1 - \dfrac{1}{4} - \dfrac{2}{3} \right) \times 11$

$= \dfrac{3}{4} + \dfrac{10}{3} + \dfrac{11}{12} = \dfrac{9 + 40 + 11}{12} = 5\%$

16. (1) Using Rule 1.

$120 = \dfrac{300 \times 4 \times r}{100} + \dfrac{400 \times 3 \times r}{100}$

$\Rightarrow 24r = 120$

$\Rightarrow r = \dfrac{120}{24} = 5\%$ per annum

17. (3) Using Rule 1.

If the sum of money be x, then

$\dfrac{x \times 6 \times 3}{100} + \dfrac{x \times 5 \times 9}{100} + \dfrac{x \times 3 \times 13}{100}$

= 8160

$\Rightarrow 18x + 45x + 39x = 816000$

$\Rightarrow 102x = 816000$

$\Rightarrow x = \dfrac{816000}{102} = ₹ \ 8000$

18. (3) Using Rule 1.

If each amount lent be x, then

$\dfrac{x \times 7 \times 4}{100} + \dfrac{x \times 5 \times 4}{100} = 960$

$\Rightarrow \dfrac{48x}{100} = 960$

$\Rightarrow x = \dfrac{960 \times 100}{48} = ₹ \ 2000$

19. (3) Using Rule 1.

Let the money lent to Tom be Rs. x.

Simple interest

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\therefore \ \dfrac{500 \times 8 \times 4}{100} + \dfrac{x \times 8 \times 4}{100}$

= 210

$\Rightarrow 160 + \dfrac{32x}{100} = 210$

$\Rightarrow \dfrac{32x}{100} = 210 - 160 = 50$

$\Rightarrow x = \dfrac{50 \times 100}{32} = $ Rs. 156.25

20. (1) Using Rule 1.

Rate $= \dfrac{20}{3}$ % per annum

$\therefore$ S.I.

$= \dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \dfrac{2600 \times 20 \times T}{3 \times 100}$

$\therefore$ Required Time = 3 years

21. (1) Using Rule 1.

Principal = Rs. (60000 – 10000)

= Rs. 50000

$\therefore$ S.I. = $\dfrac{50000 \times 15 \times 2}{100}$

= Rs. 15000

22. (2) Using Rule 1.

Let the loans taken by A, B and C be Rs. x, Rs. y and Rs. z respectively.

$\therefore$ $x + y + z$ = Rs. 7930

S.I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

According to the question,

$x + \dfrac{x \times 2 \times 5}{100}$ = $y + \dfrac{y \times 3 \times 5}{100}$

= $z + \dfrac{z \times 4 \times 5}{100}$

$\Rightarrow$ $\dfrac{100x + 10x}{100}$

= $\dfrac{100y + 15y}{100}$ = $\dfrac{100z + 20z}{100}$

$\Rightarrow$ $110x = 115y = 120z$

$\Rightarrow$ $22x = 23y = 24z$

$\Rightarrow$ $\dfrac{22x}{6072} = \dfrac{23y}{6072} = \dfrac{24z}{6072}$

[LCM of 22, 23 and 24 = 6072]

$\Rightarrow$ $\dfrac{x}{276} = \dfrac{y}{264} = \dfrac{z}{253}$

$\therefore$ $x : y : z$ = 276 : 264 : 253

Sum of terms of ratio

= 276 + 264 + 253 = 793

$\therefore$ A's loan = $\dfrac{276}{793}$ × 7930

= Rs. 2760

23. (2) Using Rule 1.

Remaining amount

= Rs. (16000 – 4000)

= Rs. 12000

$\therefore$ S.I.

= $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

= $\dfrac{12000 \times 15 \times 12}{12 \times 100}$ = Rs. 1800

$\therefore$ Total amount paid

= Rs. (16000 + 1800)

= Rs. 17800

24. (*) Using Rule 1.

S.I. after 1 year

= $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

= $\dfrac{x \times 5}{100}$ = Rs. $\dfrac{x}{20}$

Principal for 2nd year

= Rs. $\left(2x + \dfrac{x}{20}\right)$ = Rs. $\dfrac{41x}{20}$

S.I. after second year

= Rs. $\left(\dfrac{41x}{20} \times \dfrac{5}{100}\right)$

= Rs. $\dfrac{41x}{400}$

Principal for third year

= Rs. $\left(3x + \dfrac{41x}{400}\right)$

= Rs. $\left(\dfrac{1200x + 41x}{400}\right)$

= Rs. $\dfrac{1241x}{400}$

$\therefore$ S.I. after 3rd year

= Rs. $\left(\dfrac{1241x}{400} \times \dfrac{5}{100}\right)$

= Rs. $\dfrac{1241x}{8000}$

$\therefore$ Required amount

= Rs. $\left(3x + \dfrac{1241x}{8000}\right)$

= Rs. $\left(\dfrac{24000x + 1241x}{8000}\right)$

= Rs. $\left(\dfrac{25241x}{8000}\right)$

25. (3) Using Rule 1.

S.I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

= $\dfrac{100000 \times 6 \times 6}{100}$ = Rs. 36000

Total pocket money

= 6 × 2500 = Rs. 15000

Total expenses of trust

= 6 × 500 = Rs. 3000

Total expenses

= Rs. (15000 + 3000)

= Rs. 18000

$\therefore$ Amount to be received by the boy

= Rs. (100000 + 36000 – 18000)

= Rs. 118000

26. (1) Let amounts be equal in T years.

S.I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$\therefore$ P + $\dfrac{P \times x \times T}{100}$

= Q + $\dfrac{Q \times y \times T}{100}$

$\Rightarrow$ $\dfrac{P\,x\,T}{100} - \dfrac{Q\,y\,T}{100}$ = Q – P

$\Rightarrow$ T $\left(\dfrac{Px - Qy}{100}\right)$ = Q – P

$\Rightarrow$ T = 100 $\left(\dfrac{Q - P}{Px - Qy}\right)$

27. (4) Let the principal be Rs. 100

Interest = Rs. 10

Actual principal = Rs. 90

$\because$ Interest on Rs. 90 = Rs. 10

$\therefore$ Interest on Rs. 100

= $\dfrac{10}{90}$ × 100

= $\dfrac{100}{9}$ = $11\dfrac{1}{9}$ %

28. (2) Let the principal be Rs. P.

S.I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

= $\dfrac{P \times 5 \times 5}{100}$ = Rs. $\dfrac{P}{4}$

Amount = P + $\dfrac{P}{4}$ = Rs. $\dfrac{5P}{4}$

According to the question,

$\dfrac{5P}{4}$ × $\dfrac{2}{100}$ = 5

$\Rightarrow$ $\dfrac{P}{40}$ = 5

$\Rightarrow$ P = 40 × 5

= Rs. 200

29. (1) Principal = Rs. 1950, Rate = 10% per annum

S. I. = $\dfrac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

= $\dfrac{1950 \times 1 \times 10}{100}$ = Rs. 195

$\therefore$ Amount = Rs. (1950 + 195)

= Rs. 2145