SHORT ANSWERS

TYPE-I

1. (2)	**2.** (2)	**3.** (3)	**4.** (1)
5. (3)	**6.** (2)	**7.** (3)	**8.** (4)
9. (3)	**10.** (3)	**11.** (1)	**12.** (1)
13. (3)	**14.** (1)	**15.** (4)	**16.** (3)
17. (1)	**18.** (3)	**19.** (2)	**20.** (1)
21. (1)	**22.** (4)	**23.** (1)	**24.** (3)
25. (4)	**26.** (2)	**27.** (3)	**28.** (2)
29. (1)	**30.** (2)	**31.** (2)	**32.** (2)
33. (1)	**34.** (3)	**35.** (2)	**36.** (2)
37. (4)	**38.** (3)	**39.** (1)	**40.** (3)
41. (3)	**42.** (4)	**43.** (4)	**44.** (4)
45. (3)	**46.** (2)	**47.** (2)	**48.** (3)
49. (3)	**50.** (4)	**51.** (2)	**52.** (3)
53. (3)	**54.** (3)	**55.** (1)	**56.** (2)
57. (1)	**58.** (3)	**59.** (1)	**60.** (1)
61. (2)	**62.** (2)	**63.** (1)	**64.** (1)
65. (1)	**66.** (2)		

TYPE-II

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

TYPE-III

1. (1)	**2.** (2)	**3.** (3)	**4.** (4)
5. (4)	**6.** (4)	**7.** (3)	**8.** (2)
9. (2)	**10.** (1)	**11.** (1)	**12.** (3)
13. (3)	**14.** (3)	**15.** (1)	**16.** (1)
17. (2)	**18.** (1)	**19.** (2)	**20.** (3)
21. (4)	**22.** (4)	**23.** (2)	**24.** (1)
25. (3)	**26.** (3)	**27.** (2)	**28.** (1)
29. (3)	**30.** (1)	**31.** (3)	**32.** (4)
33. (1)	**34.** (1)	**35.** (3)	**36.** (4)
37. (2)	**38.** (3)	**39.** (4)	**40.** (4)

TYPE-IV

1. (4)	**2.** (2)	**3.** (2)	**4.** (1)
5. (3)	**6.** (2)	**7.** (1)	**8.** (4)
9. (1)	**10.** (2)	**11.** (2)	**12.** (3)
13. (3)	**14.** (3)	**15.** (4)	**16.** (2)

TYPE-V

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

TYPE-VI

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

TYPE-VII

1. (2)	**2.** (3)	**3.** (2)	**4.** (3)
5. (2)	**6.** (1)	**7.** (2)	**8.** (4)
9. (4)	**10.** (3)	**11.** (3)	**12.** (1)
13. (3)	**14.** (2)	**15.** (3)	

EXPLANATIONS

TYPE-I

1. (2) Using Rule 1,
P = ₹ 3000, A = ₹ 3993, n = 3 years

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

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

$$\left(1+\frac{r}{100}\right)^3 = \frac{3993}{3000} = \frac{1331}{1000}$$

$$\left(1+\frac{r}{100}\right)^3 = \left(\frac{11}{10}\right)^3$$

$$\Rightarrow 1+\frac{r}{100} = \frac{11}{10}$$

$$\Rightarrow \frac{r}{100} = \frac{11}{10} - 1$$

$$\Rightarrow \frac{r}{100} = \frac{1}{10} \Rightarrow r = \frac{100}{10}$$

$\therefore$ r = 10%

2. (2) Using Rule 1,

$$A = 10{,}000\left(1+\frac{2}{100}\right)^4$$

$$= 10{,}000\left(\frac{51}{50}\right)^4 = 10824.3216$$

$\therefore$ Interest
= 10,824.3216 – 10,000
= ₹ 824.32

3. (3) Using Rule 1,
According to question,

$$2420 = 2000\left(1+\frac{10}{100}\right)^t$$

$$\frac{2420}{2000} = \left(\frac{11}{10}\right)^t$$

$$\text{or,} \left(\frac{11}{10}\right)^t = \frac{121}{100}$$

$$\text{or,} \left(\frac{11}{10}\right)^t = \left(\frac{11}{10}\right)^2$$

$\therefore$ t = 2 years

4. (1) Using Rule 1,
Let the required time be *n* years.
Then,

$$1331 = 1000\left(1+\frac{10}{100}\right)^n$$

$$\left[\therefore P_1 = P\left(1+\frac{r}{100}\right)^n\right]$$

$$\Rightarrow \frac{1331}{1000} = \left(\frac{10+1}{10}\right)^n$$

$$\Rightarrow \left(\frac{11}{10}\right)^n = \left(\frac{11}{10}\right)^3$$

$\Rightarrow n = 3$

5. (3) Using Rule 1,
Let the principal be ₹ P.

$$\therefore 270.40 = P\left(1+\frac{4}{100}\right)^2$$

$$\Rightarrow 270.40 = P\ (1 + 0.04)^2$$

$$\Rightarrow P = \frac{270.40}{1.04 \times 1.04} = ₹\ 250$$

6. (2) Using Rule 1,
Let the sum be ₹ P and rate of interest be R% per annum. Then,

$$P\left(1+\frac{R}{100}\right)^2 = 9680 \quad \text{...(i)}$$

$$P\left(1+\frac{R}{100}\right)^3 = 10648 \quad \text{...(ii)}$$

On dividing equation (ii) by (i)

$$1+\frac{R}{100} = \frac{10648}{9680}$$

$$\Rightarrow \frac{R}{100} = \frac{10648}{9680} - 1$$

$$= \frac{10648 - 9680}{9680}$$

$$\Rightarrow \frac{R}{100} = \frac{968}{9680} = \frac{1}{10}$$

$$\Rightarrow R = \frac{1}{10} \times 100 = 10\,\%$$

7. (3) Using Rule 1,
Let the rate per cent per annum be *r*. Then,

$$2500 = 2304\left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^2 = \frac{2500}{2304} = \left(\frac{50}{48}\right)^2$$

$$\Rightarrow 1+\frac{r}{100} = \frac{50}{48} = \frac{25}{24}$$

$$\Rightarrow \frac{r}{100} = \frac{25}{24} - 1 = \frac{1}{24}$$

$$\Rightarrow r = \frac{100}{24} = \frac{25}{6} = 4\frac{1}{6}\,\%$$

8. (4) Using Rule 1,
Let the sum be ₹ *x*.

$$\therefore 1352 = x\left(1+\frac{4}{100}\right)^2$$

$$\Rightarrow 1352 = x\left(1+\frac{1}{25}\right)^2$$

$$\Rightarrow 1352 = x\left(\frac{26}{25}\right)^2$$

$$\Rightarrow x = \frac{1352 \times 25 \times 25}{26 \times 26}$$

= ₹ 1250

9. (3) Using Rule 1,
The interest is compounded quarterly.

$$\therefore R = \frac{20}{4} = 5\%$$

Time = 3 quarters

$$\therefore \text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$= 16000\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$$

$$= 16000\left[\left(\frac{21}{20}\right)^3 - 1\right]$$

$$= 16000\left(\frac{9261-8000}{8000}\right)$$

$$= 16000 \times \frac{1261}{8000} = ₹\ 2522$$

10. (3) Using Rule 3,
Amount

$$= P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)\left(1+\frac{R_3}{100}\right)$$

$$= 10000\left(1+\frac{4}{100}\right)\left(1+\frac{5}{100}\right)\left(1+\frac{6}{100}\right)$$

$$= 10000 \times \frac{26}{25} \times \frac{21}{20} \times \frac{53}{50}$$

A = ₹ 11575.2
∴ C.I. = ₹ (11575.2–10000)
= ₹ 1575.2

11. (1) Using Rule 3,
Amount

$$= 2000\left(1+\frac{4}{100}\right)\left(1+\frac{3}{100}\right)$$

= 2000 ×1.04 ×1.03
= ₹ 2142.40
∴ CI = ₹ (2142.40 – 2000)
= ₹ 142.40

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

$$\therefore \text{CI} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$\Rightarrow 5044 = 32000\left[\left(1+\frac{R}{400}\right)^3 - 1\right]$$

[∵ Interest is compounded quarterly]

$$\Rightarrow \frac{5044}{32000} = \left(1+\frac{R}{400}\right)^3 - 1$$

$$\Rightarrow \left(1+\frac{R}{400}\right)^3 - 1 = \frac{1261}{8000}$$

$$\Rightarrow \left(1+\frac{R}{400}\right)^3 = 1+\frac{1261}{8000}$$

$$\Rightarrow \left(1+\frac{R}{400}\right)^3 = \frac{9261}{8000} = \left(\frac{21}{20}\right)^3$$

$$\Rightarrow 1+\frac{R}{400} = \frac{21}{20} \Rightarrow \frac{R}{400} = \frac{21}{20} - 1 = \frac{1}{20}$$

$$\Rightarrow R = \frac{400}{20} = 20$$

13. (3) Using Rule 1,

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^t$$

$$= 8000\left(1+\frac{15}{100}\right)^{2\frac{1}{3}}$$

$$= 8000\left(1+\frac{3}{20}\right)^2\left(1+\frac{3}{20\times 3}\right)$$

$$= 8000 \times \frac{23}{20} \times \frac{23}{20} \times \frac{21}{20}$$

= ₹ 11109
∴ Compound Interest
= ₹ (11109 – 8000) = ₹ 3109.

14. (1) Using Rule 1 and 2,
The rate of interest is compounded half yearly,
∴ *r* = 10% per half year

Let time = $\frac{T}{2}$ years = half years

According to the question,

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^t$$

$$\Rightarrow 13310 = 10000\left(1+\frac{10}{100}\right)^T$$

$$\Rightarrow \frac{13310}{10000} = \left(\frac{11}{10}\right)^T$$

$$\Rightarrow \left(\frac{11}{10}\right)^T = \frac{1331}{1000} = \left(\frac{11}{10}\right)^3$$

$$\Rightarrow T = 3 \text{ half years} = 1\frac{1}{2} \text{ years}$$

15. (4) Let the principal be ₹ x. Now,

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$\Rightarrow 1261 = x\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$$

$$\Rightarrow 1261 = x\left(\frac{9261}{8000} - 1\right)$$

$$\Rightarrow 1261 = x\left(\frac{9261-8000}{8000}\right)$$

$$= \frac{1261x}{8000}$$

$$\Rightarrow x = \frac{1261\times 8000}{1261} = ₹\ 8000$$

16. (3) Using Rule 1,
Let the sum be P.
As, the interest is compounded half-yearly,
$\therefore$ R = 2%, T = 2 half years

$$\therefore A = P\left(1+\frac{R}{100}\right)^T$$

$$\Rightarrow 7803 = P\left(1+\frac{2}{100}\right)^2$$

$$\Rightarrow 7803 = P\left(1+\frac{1}{50}\right)^2$$

$$\Rightarrow 7803 = P\times\frac{51}{50}\times\frac{51}{50}$$

$$\Rightarrow P = \frac{7803\times 50\times 50}{51\times 51} = ₹\ 7500$$

17. (1) Using Rule 1,

$$5832 = P\left(1+\frac{8}{100}\right)^2$$

$$\Rightarrow 5832 = P\left(1+\frac{2}{25}\right)^2$$

$$\Rightarrow 5832 = P\times\frac{27}{25}\times\frac{27}{25}$$

$$\Rightarrow P = \frac{5832\times 25\times 25}{27\times 27} = ₹\ 5000$$

18. (3) Amount

$$= 6000\left(1+\frac{10}{100}\right)\times\left(1+\frac{\frac{1}{2}\times 10}{100}\right)$$

$$= 6000\times\frac{11}{10}\times\frac{21}{20} = ₹\ 6930$$

Aliter : Using Rule 4,
Here, t = nF

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

$\therefore$ CI = ₹ (6930 – 6000) = ₹ 930

19. (2) Using Rule 1 and 2,
Interest is compounded half yearly.
$\therefore$ Rate of interest = 5%

Time = $\frac{n}{2}$ years (let)

or n half-years

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

$$\Rightarrow 9261 = 8000\left(1+\frac{5}{100}\right)^n$$

$$\Rightarrow \frac{9261}{8000} = \left(\frac{21}{20}\right)^n$$

$$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^n$$

$\Rightarrow n$ = 3 half years

$= \frac{3}{2}$ years = $1\frac{1}{2}$ years

20. (1) Using Rule 1,

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

Let rate be 'r'

$$\Rightarrow \frac{1102.50}{1000} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \frac{11025}{10000} = \left(1+\frac{r}{100}\right)^2$$

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

$$\Rightarrow 1 + \frac{r}{100} = \frac{105}{100}$$

$$\Rightarrow \frac{r}{100} = \frac{5}{100}$$

$\Rightarrow r = 5\%$

21. (1) Using Rule 1 and 2,
Rate = 10% per annum = 5% half yearly

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

$$\Rightarrow 926.10 = 800\left(1+\frac{5}{100}\right)^T$$

$$\Rightarrow \frac{9261}{8000} = \left(\frac{21}{20}\right)^T$$

$$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^T$$

$\therefore$ Time = 3 half years

$= 1\frac{1}{2}$ years

22. (4) Using Rule 1,

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

$$= 6000\left(1+\frac{5}{100}\right)^2$$

$$= 6000\times\frac{21}{20}\times\frac{21}{20} = ₹\ 6615$$

23. (1) Using Rule 1 and 2,
Let the required time be t years.
Interest is compounded half yearly.
$\therefore$ Time = $2t$ half years

and rate = $\frac{20}{2}$ = 10%

$$\therefore \quad 1000\left(1+\frac{10}{100}\right)^{2t} = 1331$$

$$\Rightarrow \left(\frac{11}{10}\right)^{2t} = \frac{1331}{1000}$$

$$\Rightarrow \left(\frac{11}{10}\right)^{2t} = \left(\frac{11}{10}\right)^3 \Rightarrow 2t = 3$$

$$\therefore \quad t = \frac{3}{2} \text{ years or } 1\frac{1}{2} \text{ years}$$

24. (3) Using Rule 1,

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

$\Rightarrow$ 30000 + 4347

$$= 30000\left(1+\frac{7}{100}\right)^T$$

$$\Rightarrow \frac{34347}{30000} = \left(\frac{107}{100}\right)^T$$

$$\Rightarrow \frac{11449}{10000} = \left(\frac{107}{100}\right)^2 = \left(\frac{107}{100}\right)^T$$

$\Rightarrow$ Time = 2 years

25. (4) Using Rule 1,
If the rate of C.I. be r% per annum, then

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

$$\Rightarrow 8820 = 8000\left(1+\frac{r}{100}\right)^{2}$$

$$\Rightarrow \frac{8820}{8000} = \left(1+\frac{r}{100}\right)^{2}$$

$$\Rightarrow \frac{441}{400} = \left(\frac{21}{20}\right)^{2} = \left(1+\frac{r}{100}\right)^{2}$$

$$\Rightarrow 1 + \frac{r}{100} = \frac{21}{20}$$

$$\Rightarrow \frac{r}{100} = \frac{21}{20} - 1 = \frac{1}{20}$$

$$\Rightarrow r = \frac{1}{20} \times 100$$

$\therefore r = 5\%$ per annum

26. (2) Using Rule 3,

$$A = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)$$

$$= 10000\left(1+\frac{10}{100}\right)\left(1+\frac{12}{100}\right)$$

$$= 10000 \times \frac{11}{10} \times \frac{28}{25}$$

= ₹ 12320

27. (3) Using Rule 1,

$$CI = P\left[\left(1+\frac{R}{100}\right)^{T} - 1\right] - \frac{PR}{100}$$

$$\Rightarrow 420 = P\left[\left(1+\frac{5}{100}\right)^{2} - 1\right] - \frac{P \times 5}{100}$$

$$\Rightarrow 420 = P\left[\left(\frac{21}{20}\right)^{2} - 1\right] - \frac{5P}{100}$$

$$\Rightarrow 420 = \frac{41P}{400} - \frac{5P}{100} = \frac{21P}{400}$$

$$\Rightarrow P = \frac{420 \times 400}{21} = ₹\ 8000$$

28. (2) Using Rule 1,
Amount

$$= 2000\left(1+\frac{5}{100}\right)^{2} + 2000\left(1+\frac{5}{100}\right)$$

$$= 2000 \times \left(\frac{21}{20}\right)^{2} + 2000\left(\frac{21}{20}\right)$$

$$= 2000 \times \frac{21}{20} \times \frac{41}{20} = ₹\ 4305$$

$\therefore$ Required amount
= 4305 + 2000 = ₹ 6305

29. (1) Using Rule 1 and 2,
Time = t half year
and R = 5% per half year

$$\therefore A = P\left(1+\frac{R}{100}\right)^{T}$$

$$\Rightarrow \frac{92610}{80000} = \left(1+\frac{5}{100}\right)^{T}$$

$$\Rightarrow \frac{9261}{8000} = \left(\frac{21}{20}\right)^{T}$$

$$\Rightarrow T = 3 \text{ half years or } 1\frac{1}{2} \text{ years}$$

$$\Rightarrow \left(\frac{21}{20}\right)^{3} = \left(\frac{21}{20}\right)^{T}$$

30. (2) If each instalment be x, then
Present worth of first instalment

$$= \frac{x}{1+\frac{10}{100}} = \frac{10x}{11}$$

Present worth of second instalment

$$= \frac{x}{\left(1+\frac{10}{100}\right)^{2}} = \frac{100}{121}x$$

$$\therefore \frac{10}{11}x + \frac{100}{121}x = 21000$$

$$\Rightarrow \frac{110x + 100x}{121} = 21000$$

$$\Rightarrow 210x = 21000 \times 121$$

$$\Rightarrow x = \frac{21000 \times 121}{210}\ x = ₹\ 12100$$

Aliter : Using Rule 9,
Here, n = 2, p = ₹ 21000,
r = 10%
Each annual instalment

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

$$= \frac{21000}{\frac{100}{110} + \left(\frac{100}{110}\right)^{2}}$$

$$= \frac{21000}{\frac{100}{110} + \frac{10000}{12100}}$$

$$= \frac{21000}{\frac{10}{11} + \frac{100}{121}}$$

$$= \frac{21000}{110+100} \times 121$$

$$= \frac{21000}{210} \times 121$$

= 12100

31. (2) Using Rule 1,

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

$$\Rightarrow 882 = 800\left(1+\frac{5}{100}\right)^{T}$$

$$\Rightarrow \frac{882}{800} = \left(\frac{21}{20}\right)^{T}$$

$$\Rightarrow \frac{441}{400} = \left(\frac{21}{20}\right)^{2} = \left(\frac{21}{20}\right)^{T}$$

$\therefore$ T = 2 years

32. (2) Using Rule 1,

$$C.I. = P\left[\left(1+\frac{R}{100}\right)^{T} - 1\right]$$

$$= 5000\left[\left(1+\frac{10}{100}\right)^{3} - 1\right]$$

$$= 5000\left[\left(\frac{11}{10}\right)^{3} - 1\right]$$

$$C.I. = \frac{5000 \times 331}{1000} = ₹\ 1655$$

33. (1) Using Rule 1 and 2,

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

$$\Rightarrow \frac{3362}{3200} = \left(1+\frac{10}{400}\right)^{4t}$$

$$\Rightarrow \frac{1681}{1600} = \left(\frac{41}{40}\right)^{4t}$$

$\Rightarrow \left(\frac{41}{40}\right)^2 = \left(\frac{41}{40}\right)^{4t}$

$\Rightarrow 4t = 2 \Rightarrow t = \frac{1}{2}$ year

34. (3) Using Rule 1,
Let the principal be Rs. P

$\therefore$ C.I. $= P\left[\left(1+\frac{R}{100}\right)^2 - 1\right]$

$\Rightarrow 328 = P\left[\left(1+\frac{5}{100}\right)^2 - 1\right]$

$\Rightarrow 328 = P\left[\left(\frac{21}{20}\right)^2 - 1\right]$

$\Rightarrow 328 = P\left(\frac{441}{400} - 1\right)$

$\Rightarrow 328 = P\left(\frac{441-400}{400}\right)$

$\Rightarrow 328 = \frac{41P}{400}$

$\Rightarrow P = \frac{328 \times 400}{41} = ₹\ 3200$

35. (2) Present worth of bike

$= P\left(1-\frac{R}{100}\right)^T$

$= 62500\left(1-\frac{4}{100}\right)^2$

$= 62500\left(1-\frac{1}{25}\right)^2$

$= 62500\left(\frac{25-1}{25}\right)^2$

$= \frac{62500 \times 24 \times 24}{25 \times 25}$

$= ₹\ 57600$

36. (2) C.I. – S.I.
$= 615 - 600 = ₹\ 15$

S.I. for 1 year $= \frac{600}{2} = ₹\ 300$

$\therefore$ S.I. for 1 year on ₹ 300
$= ₹\ 15$

$\therefore$ Rate $= \frac{15 \times 100}{300 \times 1} = 5\%$

$\therefore \frac{PRT}{100} = 600$

$\Rightarrow P \times \frac{5 \times 2}{100} = 600$

$\Rightarrow P = 600 \times 10 = ₹\ 6000$

37. (4) Using Rule 1,

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

$\Rightarrow 13230 = 12000\left(1+\frac{5}{100}\right)^n$

$\Rightarrow \frac{13230}{12000} = \left(1+\frac{1}{20}\right)^n$

$\Rightarrow \frac{441}{400} = \left(\frac{21}{20}\right)^n$

$\Rightarrow \left(\frac{21}{20}\right)^n = \left(\frac{21}{20}\right)^2$

$\Rightarrow n = 2$ years

38. (3) Using Rule 1,
Principal (P) = Rs. S
Rate (R) = 2r% per annum

$\therefore$ Amount $= P\left(1+\frac{R}{100}\right)^T$

$= S\left(1+\frac{2r}{100}\right)^3 = S\left(1+\frac{r}{50}\right)^3$

39. (1) Using Rule 1,

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

$\Rightarrow 2420 = P\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 2420 = P\left(1+\frac{1}{10}\right)^2 = P\left(\frac{11}{10}\right)^2$

$\Rightarrow P = \frac{2420 \times 10 \times 10}{11 \times 11}$ = Rs. 2000

40. (3) Using Rule 1,
Let principal be Rs. P.

Interest in 1 year $= \frac{PRT}{100}$

$= \frac{P \times 10}{100} = \text{Rs.}\frac{P}{10}$

According to question,

$\therefore P\left[\left(1+\frac{R}{100}\right)^2 - 1\right] - \frac{P}{10}$

$= 132$

$\Rightarrow P\left[\left(1+\frac{10}{100}\right)^2 - 1\right] - \frac{P}{10}$

$= 132$

$\Rightarrow P\left[\left(\frac{11}{10}\right)^2 - 1\right] - \frac{P}{10} = 132$

$\Rightarrow P\left(\frac{121}{100} - 1\right) - \frac{P}{10} = 132$

$\Rightarrow \frac{21P}{100} - \frac{P}{10} = 132$

$\Rightarrow \frac{21P - 10P}{100} = 132$

$\Rightarrow \frac{11P}{100} = 132$

$\Rightarrow P = \frac{132 \times 100}{11} = \text{Rs } 1200$

41. (3) Using Rule 1,
Let the principal be Rs. P.
According to the question,

$P\left(1+\frac{R}{100}\right)^2 - P\left(1+\frac{R}{100}\right) = 420$

$\Rightarrow P\left(1+\frac{R}{100}\right)\left(1+\frac{R}{100}-1\right) = 420$

$\Rightarrow P\left(1+\frac{R}{100}\right) \times \frac{R}{100} = 420$

$\Rightarrow P\left(1+\frac{5}{100}\right) \times \frac{5}{100} = 420$

$\Rightarrow P\left(1+\frac{1}{20}\right) = 420 \times 20$

$\Rightarrow P \times \frac{21}{20} = 420 \times 20$

$\Rightarrow P = \frac{420 \times 20 \times 20}{21} = \text{Rs. } 8000$

42. (4) Using Rule 1,
Time = T half–years

Rate $= \frac{5}{2}\%$ per half year

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

$\Rightarrow 68921 = 64000\left(1+\frac{5}{200}\right)^T$

$\Rightarrow \frac{68921}{64000} = \left(1+\frac{1}{40}\right)^T$

$\Rightarrow \frac{68921}{64000} = \left(\frac{41}{40}\right)^T$

$\Rightarrow \left(\frac{41}{40}\right)^3 = \left(\frac{41}{40}\right)^T$

$\Rightarrow$ T = 3 half years

$= \frac{3}{2} = 1\frac{1}{2}$ years

43. (4) Using Rule 1,

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

$\Rightarrow 12100 = P\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 12100 = P\left(\frac{11}{10}\right)^2$

$\Rightarrow 12100 = P \times \frac{121}{100}$

$\Rightarrow P = \frac{12100\times100}{121}$ = Rs. 10000

44. (4) Using Rule 1,

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

$\Rightarrow 1348.32 = 1200\left(1+\frac{R}{100}\right)^2$

$\Rightarrow \frac{1348.32}{1200} = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow \frac{134832}{120000} = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow \frac{11236}{10000} = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow \left(\frac{106}{100}\right)^2 = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow \frac{106}{100} = 1+\frac{R}{100}$

$\Rightarrow 1+\frac{6}{100} = 1+\frac{R}{100}$

$\Rightarrow$ R = 6% per annum.

45. (3) Using Rule 1,

Rate of interest

$= \frac{20}{4}$ = 5% per quarter

Time = 3 quarters

$\therefore$ C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 12000\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$

$= 12000\left[\left(1+\frac{1}{20}\right)^3 - 1\right]$

$= 12000\left[\left(\frac{21}{20}\right)^3 - 1\right]$

$= 12000\left(\frac{9261}{8000} - 1\right)$

$= \frac{12000\times1261}{8000}$ = Rs. 1891.5

46. (2) Amount

= Rs. (30000 + 4347)

= Rs. 34347

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

$\Rightarrow 34347 = 30000\left(1+\frac{7}{100}\right)^n$

$\Rightarrow \frac{34347}{30000} = \left(\frac{107}{100}\right)^n$

$\Rightarrow \frac{11449}{10000} = \left(\frac{107}{100}\right)^n$

$\Rightarrow \left(\frac{107}{100}\right)^2 = \left(\frac{107}{100}\right)^n$

$\Rightarrow n$ = 2 years

47. (2) Let the principal be Rs. P.

$\therefore A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 2420 = P\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 2420 = P\times\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 2420 = P\left(\frac{11}{10}\right)^2$

$\Rightarrow P = \frac{2420\times10\times10}{11\times11}$

= Rs. 2000

48. (3) Rate of interest = $\frac{8}{4}$ = 2% per quarter

Time = 3 quarters

C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 5000\left[\left(1+\frac{2}{100}\right)^3 - 1\right]$

$= 5000\left[(1.02)^3 - 1\right]$

= 5000 (1.061208 –1)

= 5000 × 0.061208

= Rs. 306.04

49. (3) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 800 = P\left(1+\frac{R}{100}\right)^3$ ....(i)

and,

$840 = P\left(1+\frac{R}{100}\right)^4$ ....(ii)

On dividing equation (ii) by (i),

$\frac{840}{800} = 1+\frac{R}{100}$

$\Rightarrow \frac{21}{20} = 1+\frac{R}{100}$

$\Rightarrow \frac{R}{100} = \frac{21}{20} - 1 = \frac{1}{20}$

$\Rightarrow R = \frac{1}{20}\times100$

= 5% per annum

50. (4) Rate = 10% Per annum

= 5% per half year

Time = T years = 2T half years

$\therefore A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 926.10 = 800\left(1+\frac{5}{100}\right)^{2T}$

$\Rightarrow \frac{926.1}{800} = \left(1+\frac{1}{20}\right)^{2T}$

$\Rightarrow \frac{9261}{8000} = \left(\frac{21}{20}\right)^{2T}$

$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^{2T}$

$\Rightarrow$ 2T = 3 $\Rightarrow$ T = $\frac{3}{2}$ years

51. (2) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 4000 = 2000\left(1+\frac{R}{100}\right)^2$

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

$\Rightarrow 1+\frac{R}{100} = \sqrt{2}$ .....(1)

$\therefore 8000 = 2000\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 4 = (\sqrt{2})^T$

$\Rightarrow (\sqrt{2})^4 = (\sqrt{2})^T$

$\Rightarrow T = 4$ years

52. (3) $A = P\left(1+\frac{R}{100}\right)^T$

$= 64000\left(1+\frac{7.5}{100}\right)^3$

$= 64000\left(1+\frac{3}{40}\right)^3$

$= 64000\left(\frac{43}{40}\right)^3$

$= \frac{64000\times 43\times 43\times 43}{40\times 40\times 40}$

= Rs. 79507

$\therefore$ C.I. = Rs. (79507 – 64000)

= Rs. 15507

53. (3) Principal = Rs. 4096

Time = $\frac{3}{2}$ years = 3 half years

Rate = $\frac{25}{2}\%$ per annum

= $\frac{25}{4}\%$ per half year

$\therefore A = P\left(1+\frac{R}{100}\right)^T$

$= 4096\left(1+\frac{25}{400}\right)^3$

$= 4096\left(1+\frac{1}{16}\right)^3$

$= 4096\times\frac{17}{16}\times\frac{17}{16}\times\frac{17}{16}$

= Rs. 4913

54. (3) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 11664 = 10000\left(1+\frac{R}{100}\right)^2$

$\Rightarrow \frac{11664}{10000} = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow \left(\frac{108}{100}\right)^2 = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow 1+\frac{R}{100} = \frac{108}{100}$

$\Rightarrow \frac{R}{100} = \frac{108}{100} - 1 = \frac{8}{100}$

$\therefore R = \frac{8}{100}\times 100$

= 8% per annum

55. (1) C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 4000\left[\left(1+\frac{10}{100}\right)^4 - 1\right]$

$= 4000\left[\left(\frac{11}{10}\right)^4 - 1\right]$

= 4000 (1.4641 – 1)

= 4000 × 0.4641 = Rs. 1856.4

56. (2) $A = P\left(1+\frac{R}{100}\right)^T$

$\therefore$ 2420 $= P\left(1+\frac{R}{100}\right)^2$ .... (i)

and, 2662 $= P\left(1+\frac{R}{100}\right)^3$ .. (ii)

By equation (ii) ÷ (i)

$\frac{2662}{2420} = 1 + \frac{R}{100}$

$\Rightarrow \frac{R}{100} = \frac{2662}{2420} - 1$

$= \frac{2662-2420}{2420}$

$\Rightarrow \frac{R}{100} = \frac{242}{2420} = \frac{1}{10}$

$\Rightarrow$ R = 10% per annum.

From equation (i),

$2420 = P\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 2420 = P\left(\frac{11}{10}\right)^2$

$\Rightarrow 2420 = P\times\frac{121}{100}$

$\Rightarrow P = \frac{2420\times 100}{121}$

= Rs. 2000

57. (1) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 6000 = 3000\left(1+\frac{R}{100}\right)^2$

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

On squaring,

$4 = \left(1+\frac{R}{100}\right)^4$

i.e. Amount

= Rs. (4 × 3000)

= Rs. 12000

$\therefore$ C.I. = Rs. (12000 – 3000)

= Rs. 9000

58. (3) Rate of interest

= 12% per annum

= 6% per half–year

Time = 2 half years

$\therefore$ C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 12500\left[\left(1+\frac{6}{100}\right)^2 - 1\right]$

$= 12500\left[\left(1+\frac{3}{50}\right)^2 - 1\right]$

$= 12500\left[\left(\frac{53}{50}\right)^2 - 1\right]$

$= 12500\left(\frac{2809}{2500} - 1\right)$

$= \text{Rs.}\left(\frac{12500\times 309}{2500}\right)$

= Rs. 1545

59. (1) Let the principal be Rs. P.

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

$\Rightarrow 6655 = P\left(1+\frac{10}{100}\right)^3$

$\Rightarrow 6655 = P\left(1+\frac{1}{10}\right)^3$

$\Rightarrow 6655 = P\left(\frac{11}{10}\right)^3$

$\Rightarrow P = \frac{6655\times 10\times 10\times 10}{11\times 11\times 11}$

= Rs. 5000

60. (1) Let the time be T years.

$\therefore$ $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 9261 = 8000\left(1+\frac{5}{100}\right)^T$

$\Rightarrow \frac{9261}{8000} = \left(1+\frac{1}{20}\right)^T$

$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^T$

$\Rightarrow$ T = 3 years

61. (2) C.I. = $P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 1000\left[\left(1+\frac{10}{100}\right)^3 - 1\right]$

$= 1000\left[\left(1+\frac{1}{10}\right)^3 - 1\right]$

$= 1000\left[\left(\frac{11}{10}\right)^3 - 1\right]$

$= 1000\left(\frac{1331}{1000} - 1\right)$

$= \frac{1000\times 331}{1000}$ = Rs. 331

62. (2) C.I. = $P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 25000\left[\left(1+\frac{5}{100}\right)^2 - 1\right]$

$= 25000\left[\left(1+\frac{1}{20}\right)^2 - 1\right]$

$= 25000\left(\frac{441}{400} - 1\right)$

$= 2500\left(\frac{441-400}{400}\right)$

$= \frac{25000\times 41}{400}$ = Rs. 2562.5

63. (1) Rate = 10% per annum
= 5% per half year

Time = $1\frac{1}{2}$ years = 3 half years

$\therefore$ C.I. = $P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 24000\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$

$= 24000\left[\left(1+\frac{1}{20}\right)^3 - 1\right]$

$= 24000\left[\left(\frac{21}{20}\right)^3 - 1\right]$

$= 24000\left(\frac{9261}{8000} - 1\right)$

$= \frac{24000\times 1261}{8000}$ = Rs. 3783

64. (1) C.I. = $P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 3225 = P\left[\left(1+\frac{15}{100}\right)^2 - 1\right]$

$\Rightarrow 3225 = P\left[\left(1+\frac{3}{20}\right)^2 - 1\right]$

$\Rightarrow 3225 = P\left[\left(\frac{23}{20}\right)^2 - 1\right]$

$\Rightarrow 3225 = P\left(\frac{529}{400} - 1\right)$

$\Rightarrow 3225 = P\left(\frac{529-400}{400}\right)$

$\Rightarrow 3225 = P \times \frac{129}{400}$

$\Rightarrow P = \frac{3225\times 400}{129}$

= Rs. 10000

65. (1) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 3993 = 3000\left(1+\frac{x}{100}\right)^3$

$\Rightarrow \frac{3993}{3000} = \left(1+\frac{x}{100}\right)^3$

$\Rightarrow \frac{1331}{1000} = \left(1+\frac{x}{100}\right)^3$

$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(1+\frac{x}{100}\right)^3$

$\Rightarrow 1 + \frac{x}{100} = \frac{11}{10}$

$\Rightarrow \frac{x}{100} = \frac{11}{10} - 1 = \frac{1}{10}$

$\Rightarrow x = \frac{1}{10} \times 100$

= 10% per annum

66. (2) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 2P = P\left(1+\frac{19}{100}\right)^T$

$\Rightarrow 2 = \left(\frac{119}{100}\right)^T$

$\Rightarrow 2 = (1.19)^T$

If T = 4 years,

$(1.19)^4 > 2$

TYPE-II

1. (3) Let the sum be P.

$\therefore 101.50 = P\left[\left(1+\frac{3}{100}\right)^2 - 1\right]$

$\left[\because \text{C.I.} = P\left[\left(1+\frac{r}{100}\right)^n - 1\right]\right]$

$\Rightarrow 101.50 = P\left[\left(\frac{103}{100}\right)^2 - 1\right]$

$= P\left(\frac{10609-10000}{10000}\right)$

$\Rightarrow$ P = ₹ $\frac{101.50\times 10000}{609}$

= ₹ $\frac{1015000}{609}$

$\therefore$ S.I. = $\frac{1015000\times 2\times 3}{609\times 100}$ = ₹ 100

Aliter : Using Rule 10,
Here, C.I. = Rs 101.50
R = 3%, S.I. = ?

C.I. = S.I. $\left(1+\frac{R}{200}\right)$

101.50 = S.I. $\left(1+\frac{3}{200}\right)$

S.I. = $\frac{101.50\times 200}{203}$

S.I. = ₹ 100

2. (2) Using Rule 1,
Suppose principal be x

$\Rightarrow x\left\{\left(1+\frac{5}{100}\right)^3 - 1\right\} = 252.20$

$\Rightarrow x\left\{\left(\frac{21}{20}\right)^3 - 1\right\} = 252.20$

$\Rightarrow x\left\{\frac{21\times 21\times 21 - 20\times 20\times 20}{20\times 20\times 20}\right\} = 252.20$

$\Rightarrow x\frac{1261}{8000} = 252.20$

$\therefore x = \frac{252 \cdot 20 \times 8000}{1261} = 1600$

$\Rightarrow \text{SI} = \frac{1600 \times 5 \times 3}{100}$ = ₹ 240

3. (3) Using Rule 10,
If SI on a certain sum for two years is x and CI is y, then

$y = x\left(1 + \frac{r}{200}\right)$

$\Rightarrow 282.15 = 270\left(1 + \frac{r}{100}\right)$

$\Rightarrow 1 + \frac{r}{200} = \frac{282.15}{270}$

$\Rightarrow \frac{r}{200} = \frac{282.15}{270} - 1$

$\Rightarrow \frac{r}{200} = \frac{12.15}{270}$

$\Rightarrow r = \frac{12.15 \times 200}{270} = 9\%$

4. (2) C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 510 = P\left[\left(1 + \frac{25}{200}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left(\frac{81}{64} - 1\right)$

$\Rightarrow P = \frac{510 \times 64}{17} = 1920$

$\therefore$ S.I. $= \frac{1920 \times 2 \times 25}{100 \times 2}$ = ₹ 480

Aliter : Using Rule 10,
Here, C.I. = ₹ 510

R = $12\frac{1}{2}$%, S.I. = ?

C.I. = S.I. $\left(1 + \frac{R}{200}\right)$

$510 = \text{S.I.}\left(1 + \frac{25}{400}\right)$

S.I. = $\frac{510 \times 400}{425}$

S.I. = ₹ 480

5. (3) Let the principal be P and rate of interest be r per cent per annum. Then,

C. I = $P\left[\left(1 + \frac{r}{100}\right)^2 - 1\right]$

$\Rightarrow 40.80 = P\left[\left(1 + \frac{r}{100}\right)^2 - 1\right]$....(i)

S.I. = $\frac{P.r.t}{100} \Rightarrow 40 = \frac{Pr \times 2}{100}$ ...(ii)

$\therefore \frac{40.80}{40} = \frac{P\left[\left(1 + \frac{r}{100}\right)^2 - 1\right]}{\frac{2Pr}{100}}$

$\Rightarrow 1.02$

$= \frac{100}{2r}\left[1 + \frac{r^2}{10000} + \frac{2r}{100} - 1\right]$

$\Rightarrow 1.02 = \frac{r}{200} + 1$

$\Rightarrow \frac{r}{200} = 1.02 - 1$

$\Rightarrow r = 0.02 \times 200$

$\therefore r$ = 4% per annum.

Aliter : Using Rule 10,
Here, C.I. = ₹ 40.80
S.I. = ₹ 40, R = ?

C.I.= S.I. $\left(1 + \frac{R}{200}\right)$

$40.80 = 40\left(1 + \frac{R}{200}\right)$

$\frac{4080}{4000} = 1 + \frac{R}{200}$

$\frac{408}{400} = \frac{200 + R}{200}$

408 = 400 + 2R
2R = 8
R = 4%

6. (1) Let the principal be P.

$\therefore$ C.I. = $P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 328 = P\left[\left(1 + \frac{5}{100}\right)^2 - 1\right]$

$\Rightarrow 328 = P\left[\frac{441}{400} - 1\right]$

$\Rightarrow 328 = P\left[\frac{441 - 400}{400}\right]$

$\Rightarrow P = \frac{328 \times 400}{41}$ = ₹ 3200

$\therefore$ S.I.

$= \frac{PRT}{100} = \frac{3200 \times 5 \times 2}{100}$ = ₹ 320

Aliter : Using Rule 10,
Here, C.I. = ₹ 328,
R = 5%, S.I. = ?

C.I.= S.I. $\left(1 + \frac{R}{200}\right)$

$328 = \text{S.I.}\left(1 + \frac{5}{200}\right)$

$328 = \text{S.I.}\left(1 + \frac{1}{40}\right)$

S.I. = $\frac{328 \times 40}{41}$

S.I. = 8 x 40 = ₹ 320

7. (2) C.I.= $P\left(1 + \frac{r}{100}\right)^t - P$

$2448 = P\left[\left(1 + \frac{r}{100}\right)^t - 1\right]$

or $2448 = P\left[\left(1 + \frac{4}{100}\right)^2 - 1\right]$

$\Rightarrow 2448 = P\left[\frac{676}{625} - 1\right]$

$2448 = P\left[\frac{51}{625}\right]$

$\therefore P = \frac{2448 \times 625}{51}$

P = ₹ 30,000

$\therefore$ S.I. = $\frac{30000 \times 4 \times 2}{100}$ = ₹ 2400

Aliter : Using Rule 10,
Here, C.I. = ₹ 2448
R = 4%, S.I. = ?

C.I.= S.I. $\left(1 + \frac{R}{200}\right)$

$2448 = \text{S.I.}\left(1 + \frac{4}{200}\right)$

$2448 = \text{S.I.}\left(1 + \frac{1}{50}\right)$

$2448 = \text{S.I.}\left(\frac{51}{50}\right)$

S.I. = $\frac{2448 \times 50}{51}$

S.I. = ₹ 2400

8. (3) Using Rule 1,
Let the principal be x and rate of interest be r% per annum.
Now,

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

$$260 = \frac{x \times r}{100} \quad \text{....(i)}$$

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$540.80 = x\left[\left(1+\frac{r}{100}\right)^{2}-1\right]$$

$$\Rightarrow 540.80 = x\left[1+\frac{2r}{100}+\frac{r^2}{10000}-1\right]$$

$$\Rightarrow 540.80 = \frac{2xr}{100}+\frac{xr^2}{10000}$$

$$\Rightarrow 540.80 = 2 \times 260 + \frac{260.r}{100}$$

$$\Rightarrow 260r = 54080 - 52000$$

$$\Rightarrow 260r = 2080$$

$$\Rightarrow r = \frac{2080}{260} = 8\,\%$$

9. (4) $\text{Principal} = \frac{\text{S.I.} \times 100}{\text{Time} \times \text{Rate}}$

$$= \frac{80 \times 100}{2 \times 4} = ₹\ 1000$$

$$\therefore \text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$= 1000\left[\left(1+\frac{4}{100}\right)^{2}-1\right]$$

$$= 1000\left[\left(\frac{26}{25}\right)^{2}-1\right]$$

$$= 1000\left(\frac{676}{625}-1\right)$$

$$= 1000\left(\frac{676-625}{625}\right)$$

$$= \frac{1000 \times 51}{625} = ₹\ 81.60$$

Aliter : Using Rule 10,
Here, S.I. = ₹ 80
R = 4%, C.I. = ?

$$\text{C.I.} = \text{S.I.}\left(1+\frac{R}{200}\right)$$

$$\text{C.I.} = 80\left(1+\frac{4}{200}\right)$$

$$= 80\left(1+\frac{1}{50}\right)$$

$$= 80 \times \frac{51}{50} = ₹\ 81.60$$

10. (4) Using Rule 1,

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$246 = P\left[\left(1+\frac{5}{100}\right)^{2}-1\right]$$

$$\Rightarrow 246 = P\left[\left(\frac{21}{20}\right)^{2}-1\right]$$

$$\Rightarrow 246 = P\left(\frac{441-400}{400}\right)$$

$$\Rightarrow 246 = \frac{41P}{400} \Rightarrow P = \frac{246 \times 400}{41}$$

$$= ₹\ 2400$$

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

$$= \frac{2400 \times 3 \times 6}{100} = ₹\ 432$$

11. (4) Difference of CI and SI for two years
= ₹ (954 – 900) = ₹ 54
∴ Sum= Difference in CI and SI

$$\times \left(\frac{100}{\text{Rate}}\right)^{2}$$

$$\text{Rate} = \frac{2 \times \text{Difference} \times 100}{\text{Simple interest}}$$

$$= \frac{2 \times 5400}{900} = 12\%$$

$$\therefore \text{Sum} = 54 \times \left(\frac{100}{12}\right)^{2}$$

$$= 54 \times \frac{25}{3} \times \frac{25}{3} = ₹\ 3750$$

Aliter : Using Rule 10,
C.I. = Rs. 954, S.I.=Rs. 900, P=?

$$\text{C.I.} = \text{S.I.}\left(1+\frac{R}{200}\right)$$

$$954 = 900\left(1+\frac{R}{200}\right)$$

$$\frac{954}{900} = 1+\frac{R}{200}$$

$$\frac{954}{900}-1 = \frac{R}{200}$$

$$\frac{954-900}{900} = \frac{R}{200}$$

$$\frac{54}{9} = \frac{R}{2}$$

$$R = 12\%$$

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

$$900 = \frac{P \times 12 \times 2}{100}$$

$$P = \text{Rs. } 3750$$

12. (4) If the principal be P then

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$\Rightarrow 420 = P\left[\left(1+\frac{10}{100}\right)^{2}-1\right]$$

$$\Rightarrow 420 = P\left(\frac{121-100}{100}\right)$$

$$\Rightarrow 420 = \frac{P \times 21}{100}$$

$$\Rightarrow P = \frac{420 \times 100}{21} = ₹\ 2000$$

$$\therefore \text{S.I.} = \frac{PRT}{100}$$

$$= \frac{2000 \times 10 \times 2}{100} = ₹\ 400$$

Aliter : Using Rule 10,
Here, C.I. = Rs. 420,
R = 10%, S.I. = ?

$$\text{C.I.} = \text{S.I.}\left(1+\frac{R}{200}\right)$$

$$420 = \text{S.I.}\left(1+\frac{10}{200}\right)$$

$$420 = \text{S.I.}\left(\frac{210}{200}\right)$$

$$\text{S.I.} = \frac{420 \times 200}{210}$$

S.I. = Rs. 400

13. (4) If the sum be P, then

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$\Rightarrow 102 = P\left[\left(1+\frac{4}{100}\right)^{2}-1\right]$$

$\Rightarrow 102 = P\left[\left(\frac{26}{25}\right)^2 - 1\right]$

$\Rightarrow 102 = P\left(\frac{676}{625} - 1\right)$

$\Rightarrow 102 = P\left(\frac{676 - 625}{625}\right)$

$\Rightarrow 102 = P \times \frac{51}{625}$

$\Rightarrow P = \frac{102 \times 625}{51} = ₹\ 1250$

$\therefore$ S.I. $= \frac{1250 \times 2 \times 4}{100} = ₹\ 100$

14. (4) Using Rule 1,
Let S.I. = ₹ 100,
& Principal = ₹ 100

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

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

$\therefore$ C.I. $= P\left[\left(1 + \frac{r}{100}\right)^T - 1\right]$

$= 8000\left[\left(1 + \frac{25}{200}\right)^2 - 1\right]$

$= 8000\left(\frac{81}{64} - 1\right) = \frac{8000 \times 17}{64}$

= ₹ 2125

15. (1) C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 2544 = P\left[\left(1 + \frac{12}{100}\right)^2 - 1\right]$

$\Rightarrow 2544 = P\left[\left(\frac{28}{25}\right)^2 - 1\right]$

$\Rightarrow 2544 = P\left(\frac{784}{625} - 1\right)$

$\Rightarrow 2544 = P\left(\frac{784 - 625}{625}\right)$

$2544 = \frac{P \times 159}{625}$

$\Rightarrow P = \frac{2544 \times 625}{159} = ₹\ 10000$

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

$= \frac{10000 \times 2 \times 12}{100} = ₹\ 2400$

Aliter : Using Rule 10,
Here, C.I. = Rs. 2544
R = 12%, S.I. = ?

C.I. $= \text{S.I.}\left(1 + \frac{R}{200}\right)$

$2544 = \text{S.I.}\left(1 + \frac{12}{200}\right)$

$2544 = \text{S.I.}\left(\frac{212}{200}\right)$

S.I. $= \frac{2544 \times 200}{212} = ₹\ 2400$

16. (2) Using Rule 1,

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

$\Rightarrow 2916 = x\left(1 + \frac{8}{100}\right)^2$

$\Rightarrow 2916 = x\left(\frac{27}{25}\right)^2$

$\Rightarrow x = \frac{2916 \times 25 \times 25}{27 \times 27}$

= ₹ 2500

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

$= \frac{2500 \times 9 \times 3}{100} = ₹\ 675$

17. (1) Using Rule 6,
S.I. for 3 years = ₹ 3000

S.I. for 2 years $= \frac{3000}{3} \times 2$

= ₹ 2000
C.I. – S.I.
= 2050 – 2000 = ₹ 50

S.I. $= \frac{PR \times 3}{100}$

$\Rightarrow PR = \frac{3000 \times 100}{3}$

= ₹ 100000

$\therefore$ Difference $= \frac{P \times R^2}{10000}$

$\Rightarrow 50 = \frac{P \times (100000)^2}{10000 \times P^2}$

$\Rightarrow P = \frac{1000000}{50} = ₹\ 20000$

18. (1) Compound interest

$= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 410 = P\left[\left(1 + \frac{5}{100}\right)^2 - 1\right]$

$\Rightarrow 410 = P\left[\left(1 + \frac{1}{20}\right)^2 - 1\right]$

$\Rightarrow 410 = P\left[\left(\frac{21}{20}\right)^2 - 1\right]$

$\Rightarrow 410 = P\left(\frac{441}{400} - 1\right)$

$\Rightarrow 410 = P\left(\frac{41}{400}\right)$

$\Rightarrow P = \frac{410 \times 400}{41} = ₹\ 4000$

$\therefore$ S.I.

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

$= \frac{4000 \times 2 \times 5}{100} = ₹\ 400$

Aliter : Using Rule 10,
Here, C.I. = Rs. 410
R = 5%, S.I. = ?

C.I. $= \text{S.I.}\left(1 + \frac{R}{200}\right)$

$410 = \text{S.I.}\left(1 + \frac{5}{200}\right)$

$410 = \text{S.I.}\left(\frac{205}{200}\right)$

S.I. $= \frac{410 \times 200}{205}$

S.I. = Rs.400

19. (4) Principal = ₹ P (let)

$\therefore$ C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 510 = P\left[\left(1 + \frac{25}{200}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left[\left(1+\frac{1}{8}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left[\left(\frac{9}{8}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left(\frac{81}{64} - 1\right)$

$\Rightarrow 510 = P\left(\frac{81-64}{64}\right)$

$\Rightarrow 510 = \frac{17P}{64}$

$\Rightarrow P = \frac{510 \times 64}{17} = ₹\ 1920$

$\therefore$ S.I.

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

$= \frac{1920 \times 2 \times 25}{100 \times 2} = ₹\ 480$

Aliter : Using Rule 10,

Here, C.I. = ₹ 510

$R = 12\frac{1}{2}\%$, S.I. = ?

$\text{C.I.} = \text{S.I.}\left(1+\frac{R}{200}\right)$

$510 = \text{S.I.}\left(1+\frac{25}{400}\right)$

$510 = \text{S.I.}\left(\frac{425}{400}\right)$

$\text{S.I.} = \frac{510 \times 400}{425}$

S.I. = ₹ 480

20. (2) Using Rule 1,

Sum borrowed = Rs. x

$\therefore$ Simple interest after 4 years

$= \frac{x \times 4 \times 5}{100} = \text{Rs. } \frac{x}{5}$

Amount lent of on compound interest

$= \text{Rs. } \frac{x}{2}$

$\therefore \text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= \frac{x}{2}\left[\left(1+\frac{10}{100}\right)^4 - 1\right]$

$= \frac{x}{2}\left[(1.1)^4 - 1\right]$

$= \frac{x}{2}(1.4641 - 1)$

$= \text{Rs. } \frac{0.4641x}{2}$

$\therefore \frac{0.4641x}{2} - \frac{x}{5} = 3205$

$\Rightarrow \frac{2.3205x - 2x}{10} = 3205$

$\Rightarrow 0.3205x = 32050$

$\Rightarrow x = \frac{32050}{0.3205} = \text{Rs. } 100000$

21. (3) S.I. for 2 years

$= \frac{2}{3} \times 540 = \text{Rs. } 360$

C.I. – S.I.

= 376.20 – 360 = Rs. 16.20

$\therefore$ Rate of interest

$= \frac{16.20}{180} \times 100$

= 9% per annum

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

$= \frac{180 \times 100}{1 \times 9} = \text{Rs. } 2000$

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

$= \frac{350 \times 100}{2 \times 4} = \text{Rs. } 4375$

Difference $= \frac{PR^2}{10000}$

$= \frac{4375 \times 4 \times 4}{10000}$

= Rs. 7

23. (3) $\because$ S.I. for 3 years

= Rs. 240

$\therefore$ S.I. for 2 years $= \frac{240}{3} \times 2$

= Rs. 160

$\therefore \frac{PR \times 2}{100} = 160$

$\Rightarrow PR = 160 \times 50 = 8000 \ldots (i)$

Again, C.I. – S.I.

= 170 – 160 = Rs. 10

$\Rightarrow \frac{PR^2}{10000} = 10$

$\Rightarrow \frac{8000 \times R}{10000} = 10$

$\Rightarrow R = \frac{100}{8} = \frac{25}{2} = 12\frac{1}{2}\%$

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

$= \frac{1600 \times 100}{5 \times 2} = \text{Rs. } 16000$

$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$= 16000\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$

$= 16000\left[\left(\frac{21}{20}\right)^3 - 1\right]$

$= 16000\left(\frac{9261}{8000} - 1\right)$

$= \frac{16000 \times 1261}{8000} = \text{Rs. } 2522$

25. (4) Let the principal be Rs. P.

For 4 years,

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

$= \frac{P \times 4 \times 5}{100} = \text{Rs. } \frac{P}{5}$

$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

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

$= P\left[\left(\frac{11}{10}\right)^4 - 1\right]$

$= P\left(\frac{14641}{10000} - 1\right)$

$= \frac{4641P}{10000}$

According to the question,

$\frac{4641P}{10000} - \frac{P}{5} = 26410$

$\Rightarrow \frac{4641P - 2000P}{10000} = 2641$

$\Rightarrow \frac{2641P}{10000} = 2641$

$\Rightarrow P = \text{Rs. } 10000$

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

$= \frac{50\times 100}{2\times 5}$ = Rs. 500

$\therefore$ C.I. = $P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$

$= 500\left[\left(1+\frac{5}{100}\right)^{2}-1\right]$

$= 500\left[\left(1+\frac{1}{20}\right)^{2}-1\right]$

$= 500\left[\left(\frac{21}{20}\right)^{2}-1\right]$

$= 500\left(\frac{441}{400}-1\right)$

$= \frac{500\times 41}{400}$ = Rs. 51.25

27. (4) According to the question,
If principal
= Rs. 100 then interest
= Rs. 40.

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

$= \frac{40\times 100}{100\times 8}$ = 5% per annum

Case II.

$\therefore A = P\left(1+\frac{R}{100}\right)^{T}$

$= 30000\left(1+\frac{5}{100}\right)^{2}$

$= 30000\left(1+\frac{1}{20}\right)^{2}$

$= 30000\left(\frac{20+1}{20}\right)^{2}$

$= 30000\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 33075

$\therefore$ C. I. = Rs. (33075 – 30000)
= Rs. 3075

TYPE-III

1. (1) **TRICK**
As the interest was compounded half-yearly, we changed r to $\frac{r}{2}$ and t to 2t.
$\therefore$ T = 1 year & R 6%
Sum
$= \frac{36\times 100\times 100}{6\times 6}$
= ₹10000

2. (2) Compound Interest (when compounded yearly)

$= 5000\left(1+\frac{4}{100}\right)^{1.5}-5000$

$= 5000\left(\frac{26}{25}\right)^{1.5}-5000$

= 5302.9805 – 5000 = ₹ 302.9805
C.I. (When compounded half-yearly).

$= 5000\left(1+\frac{2}{100}\right)^{3}-50000$

= 5306.04 – 5000 = ₹ 306.04
Required difference
= ₹ (306.04 – 302.9805)
= ₹ 3.059 = ₹ 3.06

3. (3) Let the sum ₹ x. Then,

C.I. = $x\left(1+\frac{5}{100}\right)^{2}-x$

$= \frac{441x}{400}-x = \frac{441x-400x}{400}$

$= \frac{41}{400}x$

Now,

S.I. = $\frac{x\times 5\times 2}{100} = \frac{x}{10}$

$\therefore$ (C.I.) – (S.I.) = $\frac{41x}{400}-\frac{x}{10}$

$= \frac{41x-40x}{400} = \frac{x}{400}$

$\therefore \frac{x}{400} = 15$

$\Rightarrow$ x = 15 × 400 = 6000
Hence, the sum is ₹ 6000
Aliter : Using Rule 6,
C.I. – S.I. = ₹ 15, R = 5%, T = 2 years, P =?

C.I. – S.I. = $P\left(\frac{R}{100}\right)^{2}$

$15 = P\left(\frac{5}{100}\right)^{2}$

P = 15 × 400
P = ₹ 6000

4. (4) **Tricky Approach**
Difference of SI and CI for 3 years
$= \frac{PR(300+R)}{100^{3}}$

$\because \frac{P\times 25\times 305}{100\times 100\times 100} = 36.60$

$\Rightarrow P = \frac{36.60\times 100\times 100\times 100}{25\times 305}$

= ₹ 4800
Aliter : Using Rule 6,
C.I.–S.I. = ₹ 36.60, R = 5%, P =?, T = 3yrs.

C.I. – S.I.= $P\left(\frac{R}{100}\right)^{2}\times\left(3+\frac{R}{100}\right)$

$36.60 = P\left(\frac{5}{100}\right)^{2}\times\left(3+\frac{5}{100}\right)$

$36.60 = P\times\frac{25}{100^{2}}\times\frac{305}{100}$

$P = \frac{36.60\times 100\times 100\times 100}{25\times 305}$

$P = \frac{36600000}{25\times 305}$ = ₹ 4800

5. (4) S.I. = ₹ $\frac{2500\times 2\times 4}{100}$ = ₹ 200

C.I. = ₹ $2500\left[\left(1+\frac{4}{100}\right)^{2}-1\right]$

= ₹ $2500\left[\left(\frac{26}{25}\right)^{2}-1\right]$

= ₹ $\frac{(676-625)}{625}\times 2500$

= ₹ $\frac{51}{625}\times 2500$ = ₹ 204

$\therefore$ The required difference
= C.I. – S.I. = ₹ (204 – 200) = ₹ 4
Aliter : Using Rule 6,
Here, C.I. – S.I.= ?, P = ₹ 2500
R = 4%, T = 2

C.I. – S.I.= $P\left(\frac{R}{100}\right)^2$

$= 2500\left(\frac{4}{100}\right)^2$

$= 2500 \times \frac{1}{25} \times \frac{1}{25}$

C.I.–S.I. = ₹ 4

6. (4) Let the sum be x. Then,

C.I. $= x\left(1+\frac{10}{100}\right)^2 - x = \frac{21x}{100}$

S.I. $= \frac{x \times 10 \times 2}{100} = \frac{x}{5}$

$\therefore$ C.I. – S.I. $= \frac{21x}{100} - \frac{x}{5} = \frac{x}{100}$

Given that, $\frac{x}{100} = 65$

$\therefore x = 6500$

Hence, the sum is ₹ 6500.

Aliter : Using Rule 6,

Here, C.I. – S.I. = ₹ 65,

R = 10%, T = 2 years, P = ?

C.I. – S.I. $= P\left(\frac{R}{100}\right)^2$

$65 = P\left(\frac{10}{100}\right)^2$

P = ₹ 6500

7. (3) When difference between the compound interest and simple interest on a certain sum of money for 2 years at r% rate is x, then

x = Sum $\left(\frac{r}{100}\right)^2$

$\Rightarrow 10 = 1000\left(\frac{r}{100}\right)^2$

$\Rightarrow \left(\frac{r}{100}\right)^2 = \frac{10}{1000}$

$\Rightarrow \frac{r}{100} = \sqrt{\frac{1}{100}} = \frac{1}{10}$

$\Rightarrow r = \frac{100}{10} = 10\%$

Aliter : Using Rule 6,

Here, C.I. – S.I. = Rs. 10

R = ?, T= 2 years, P = Rs. 1000

C.I. – S.I. $= P\left(\frac{R}{100}\right)^2$

$10 = 1000\left(\frac{R}{100}\right)^2$

$10 = 1000 \times \frac{R}{100} \times \frac{R}{100}$

$\Rightarrow R^2 = 100$

$\Rightarrow R = \sqrt{100} = 10\%$

8. (2) Using Rule 6,

When difference between the compound interest and simple interest on a certain sum of money for 2 years at r % rate is x, then the sum is given by

$x\left(\frac{100}{r}\right)^2$ Here x = ₹ 80,

r = 40%

$\therefore$ Required sum = $80\left(\frac{100}{4}\right)^2$

= 80 × 25 × 25 = ₹ 50000

9. (2) Using Rule 6,

When difference between the CI and SI on a certain sum of money for 2 years at r % rate is x, then

Sum = $x \times \left(\frac{100}{r}\right)^2$

$= 1 \times \left(\frac{100}{4}\right)^2$ = ₹ 625

10. (1) Using Rule 6,

Sum = Difference $\left(\frac{100}{r}\right)^2$

$= 4 \times \left(\frac{100}{4}\right)^2$ = ₹ 2500

11. (1) Using Rule 6,

Difference between C.I. and S.I for 3 years

$= \frac{PR^2}{(100)^2}\left(\frac{R}{100}+3\right)$

$\Rightarrow 15.25 = \frac{P \times 25}{10000}\left(\frac{5}{100}+3\right)$

$\Rightarrow 15.25 = \frac{P \times 305}{400 \times 100}$

$\Rightarrow P = \frac{15.25 \times 400 \times 100}{305}$

= ₹ 2000

12. (3) Using Rule 6,

Tricky Approach

Sum = (CI – SI) $\left(\frac{100}{r}\right)^2$

$= 768 \times \left(\frac{100}{8}\right)^2$ = ₹ 1,20,000

13. (3) Using Rule 6 and 1,

If the difference between compound interest and simple interest at the rate of r% per annum for 2 years be x, then

Principal = $x\left(\frac{100}{r}\right)^2$

$= 28\left(\frac{100}{10}\right)^2$ = ₹ 2800

If the interest is compounded half yearly, then

$r = \frac{10}{2} = 5\%$,

Time = 4 half years

Simple interest $= \frac{2800 \times 5 \times 4}{100}$

= ₹ 560

Compound interest

$= 2800\left[\left(1+\frac{5}{100}\right)^4 - 1\right]$

= 2800 [1.2155 – 1]

= 2800 × 0.2155 = 603.41

$\therefore$ Difference = ₹ (603.41–560)

= ₹ 43.41

14. (3) Using Rule 1,

C.I. after 3 years

$= 6000\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$

$= 6000\left(\frac{9261-8000}{8000}\right)$

$= 6000 \times \frac{1261}{8000}$ = ₹ 945.75

CI after 2 years

$= 6000\left[\left(1+\frac{5}{100}\right)^2 - 1\right]$

$= 6000\left(\frac{441-400}{400}\right)$

$= 6000 \times \frac{41}{400}$ = ₹ 615

Required difference

= ₹ (945.75 – 615) = ₹ 330.75

15. (1) Let the principal be x.
Compound interest

$$= P\left[\left(1+\frac{R}{100}\right)^{t}-1\right]$$

$$= x\left[\left(1+\frac{10}{100}\right)^{2}-1\right]$$

$= x[(1.1)^2 - 1]$
$= x(1.21 - 1) = 0.21x$

$$SI = \frac{x\times 2\times 10}{100} = \frac{x}{5} = 0.2x$$

According to the question,
$0.21x - 0.2x = 40$
$\Rightarrow 0.01x = 40$

$$\Rightarrow x = \frac{40}{0.01} = ₹\ 4000$$

Aliter : Using Rule 6,
Here, C.I. – S.I. = ₹ 40
R = 10%, T = 2 years, P = ?

$$\text{C.I.} - \text{S.I.} = P\left(\frac{R}{100}\right)^2$$

$$40 = P\left(\frac{10}{100}\right)^2$$

P = ₹ 4000

16. (1) Using Rule 6,
Let the difference between CI and SI on a certain sum for 3 years at r % be x,
then the sum

$$= \frac{\text{Difference}\times(100)^3}{r^2(300+r)}$$

$$= \frac{122\times 100^3}{25(300+5)}$$

$$= \frac{122000000}{25\times 305} = ₹16000$$

17. (2) Using Rule 6,
Difference of two years

$$= P\left(\frac{r^2}{10000}\right)$$

$$\Rightarrow 48 = P\left(\frac{400}{10000}\right)$$

$$\Rightarrow 48 = \frac{P}{25}$$

$\Rightarrow$ P = 48 × 25 = ₹ 1200

18. (1) Using Rule 6,

$$\text{Difference} = \frac{PR^2}{10000}$$

$$\Rightarrow 25 = \frac{10000\times R^2}{10000}$$

$\Rightarrow$ R = 5%

19. (2) Using Rule 6,

$$\text{Difference} = \frac{Pr^2}{10000}$$

$$\Rightarrow 6 = \frac{P\times 5\times 5}{10000}$$

$\Rightarrow$ P = 6 × 400 = ₹ 2400

20. (3) Using Rule 6,
Rate of interest = 8% per half-year
Time = 2 half years

$$\text{Difference of interests} = \frac{PR^2}{100}$$

$$\Rightarrow 56 = \frac{P\times(8)^2}{(100)^2}$$

$$\Rightarrow P = \frac{56\times 10000}{64} = ₹\ 8750$$

21. (4) Let the sum be x
r = 10%, n = 3 years

$$\text{S.I.} = \frac{x\times r\times n}{100}$$

$$\text{S.I.} = \frac{x\times 10\times 3}{100} = \frac{3}{10}x$$

$$\text{C.I.} = \left[\left(1+\frac{r}{100}\right)^{n}-1\right]x$$

$$= \left[\left(1+\frac{10}{100}\right)^{3}-1\right]x$$

$$= \left[\left(\frac{11}{10}\right)^{3}-1\right]x$$

$$= \left(\frac{1331}{1000}-1\right)x = \frac{331}{1000}x$$

$$\frac{331}{1000}x - \frac{3}{10}x = 31$$

$$\text{or } \frac{(331-300)}{1000}x = 31$$

$$\text{or } \frac{31}{1000}x = 31$$

or x = 1000
$\therefore$ Sum = ₹ 1000

Aliter : Using Rule 6,
Here, C.I. – S.I. = ₹ 31
R = 10%, T = 3 years, P = ?
C.I. – S.I.

$$= P\times\left(\frac{R}{100}\right)^2\times\left(3+\frac{R}{100}\right)$$

$$31 = P\times\left(\frac{10}{100}\right)^2\left(3+\frac{10}{100}\right)$$

$$31 = P\times\frac{1}{100}\times\frac{31}{10}$$

P = ₹ 1000

22. (4) Using Rule 6,
Let the sum be x.
When difference between the compound interest and simple interest on a certain sum of money for 2 years at r% rate is x, then the sum is given by:

$$\text{Sum} = \text{Difference}\times\left(\frac{100}{\text{Rate}}\right)^2$$

$$= ₹\ 8\times\left(\frac{100}{4}\right)^2$$

$= ₹\ 8 \times 25 \times 25 = ₹\ 5000$

23. (2) If the interest is compounded half yearly,

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^{T}-1\right]$$

$$= P\left[\left(1+\frac{5}{100}\right)^{2}-1\right]$$

$$= P\left[\left(\frac{21}{20}\right)^{2}-1\right] = \frac{41P}{400}$$

$$\text{S.I.} = \frac{P\times R\times T}{100} = \frac{P\times 10}{100} = \frac{P}{10}$$

$$\therefore \frac{41P}{400} - \frac{P}{10} = 180$$

$$\Rightarrow \frac{41P-40P}{400} = 180$$

$$\Rightarrow \frac{P}{400} = 180$$

$\Rightarrow$ P = ₹ 72000

Aliter : Using Rule 6,
Here, C.I. – S.I. = ₹ 180
Interest is compounded half yearly

$$R = \frac{10}{5} = 5\%,$$

T = 2 years

$$\text{C.I.} - \text{S.I.} = P\left(\frac{R}{100}\right)^2$$

$\Rightarrow 180 = P\left(\frac{5}{100}\right)^2$

$\Rightarrow P = 180 \times 20 \times 20$

$P = ₹\ 72000$

24.(1) Using Rule 6,

$\text{Difference} = \frac{PR^2}{(100)^2}$

$\Rightarrow 1.50 = \frac{P \times 5 \times 5}{(100)^2}$

$\Rightarrow P = 400 \times 1.5 = ₹\ 600$

25. (3) Using Rule 6,

$\text{Time} = \frac{3}{2} \times 2 = 3$ half years

$\text{Rate} = \frac{10}{2} = 5\%$ per half year

[$\because$ when $r \to r/2$, then $t \to 2t$]

Difference

$= P\left(\frac{r^3}{1000000} + \frac{3r^2}{10000}\right)$

$\Rightarrow 244 = P\left(\frac{125}{1000000} + \frac{75}{10000}\right)$

$\Rightarrow 244 = P\left(\frac{7625}{1000000}\right)$

$\Rightarrow P = \frac{244 \times 1000000}{7625}$

$= ₹\ 32000$

26. (3) Using Rule 6,

The difference between compound interest and simple interest for two years

$= \frac{\text{Principal} \times (\text{Rate})^2}{100 \times 100}$

$\therefore \quad 1 = \frac{\text{Principal} \times (4)^2}{10000}$

$\Rightarrow \quad \text{Principal} = \frac{10000}{16} = ₹\ 625$

27. (2) Using Rule 6,

Difference of 2 years

$= \frac{p \times r^2}{10000}$

$\Rightarrow 32 = \frac{5000 \times r^2}{10000}$

$\Rightarrow r^2 = \frac{32 \times 10000}{5000} = 64$

$\Rightarrow r = \sqrt{64} = 8\%$

28. (1) Using Rule 6,

$\text{Difference} = \frac{PR^2}{10000}$

$\Rightarrow 25 = \frac{P \times 5 \times 5}{10000}$

$\Rightarrow P = ₹\ 10000$

29. (3) Using Rule 6,

$\text{Difference} = \frac{PR^2}{10000}$

$\Rightarrow 300 = \frac{P \times 10 \times 10}{10000}$

$\Rightarrow P = 300 \times 100 = ₹\ 30000$

30. (1) Using Rule 1,

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

$= \frac{32000 \times 4 \times 10}{100} = ₹\ 12800$

$\text{C.I.} = P\left[\left(1 + \frac{R}{100}\right)^4 - 1\right]$

$= 32000\left[\left(1 + \frac{10}{100}\right)^4 - 1\right]$

$= 32000\ [(1.1)^4 - 1]$

$= 32000\ (1.4641 - 1)$

$= 32000 \times 0.4641 = ₹\ 14851.2$

$\therefore$ Required difference

$= 14851.2 - 12800 = ₹\ 2051.2$

31. (3) Using Rule 6,

$\text{Difference} = \frac{PR^2}{10000}$

$\Rightarrow 63 = \frac{P \times 5 \times 5}{10000}$

$\Rightarrow P = 400 \times 63 = ₹\ 25200$

32. (4) Let the principal be Rs. P.

For 2 years

$\text{C.I.} - \text{S.I.} = \frac{PR^2}{10000}$

$\Rightarrow 1 = \frac{P \times 4 \times 4}{10000}$

$\Rightarrow P = \frac{10000}{4 \times 4} = \text{Rs. } 625$

33. (1) $\text{Difference} = \frac{PR^2}{10000}$

$\Rightarrow 4 = \frac{P \times 10 \times 10}{10000}$

$\Rightarrow P = \text{Rs. } 400$

34. (1) Difference between C.I. and S.I. for 3 years

$= \frac{Pr^2(r + 300)}{1000000}$

$\Rightarrow 93 = \frac{P \times 100(10 + 300)}{1000000}$

$\Rightarrow 93 = \frac{P \times 100 \times 310}{1000000}$

$\Rightarrow \frac{31P}{1000} = 93$

$\Rightarrow P = \frac{93000}{31} = \text{Rs. } 3000$

35. (3) Difference

$= \frac{PR^2}{10000}$

$\Rightarrow 41 = \frac{P \times 5 \times 5}{10000}$

$\Rightarrow 41 = \frac{P}{400}$

$\Rightarrow P = 41 \times 400 = \text{Rs. } 16400$

36. (4) For 3 years,

C.I. – S.I.

$= P\left(\frac{r}{100}\right)^2\left(\frac{r}{100} + 3\right)$

$\Rightarrow P\left(\frac{10}{100}\right)^2\left(\frac{10}{100} + 3\right) = 186$

$\Rightarrow P\left(\frac{1}{100}\right) \times \frac{31}{10} = 186$

$\Rightarrow P = \frac{186 \times 1000}{31} = \text{Rs. } 6000$

37. (2) Difference between C.I. and S.I. for 3 years

$= P\left(\frac{r}{100}\right)^2\left(\frac{r}{100} + 3\right)$

$= 40000\left(\frac{8}{100}\right)^2\left(\frac{8}{100} + 3\right)$

$= 40000 \times \frac{64}{10000}\left(\frac{8+300}{100}\right)$

$= 4 \times 64 \times \frac{308}{100} = \frac{78848}{100}$

= Rs. 788.48

38. (3) For 2 years,

$\text{C.I.} - \text{S.I.} = \frac{PR^2}{10000}$

$\Rightarrow 96 = \frac{15000 \times R^2}{10000}$

$\Rightarrow 15\ R^2 = 960$

$\Rightarrow R^2 = \frac{960}{15} = 64$

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

39. (4) For 2 years,

$\text{C.I.} - \text{S.I.} = \frac{PR^2}{10000}$

$= \frac{5000 \times 8 \times 8}{10000} = \text{Rs. } 32$

40. (4) For 2 years,

$\text{C.I.} - \text{S.I.} = \frac{PR^2}{10000}$

$\Rightarrow 20 = \frac{P \times 5 \times 5}{10000}$

$\Rightarrow \frac{P}{400} = 20$

$\Rightarrow$ P = Rs. (20 × 400)

= Rs. 8000

TYPE-IV

1. (4) Suppose P = ₹ 100 and amount A = ₹ 225

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

$\text{or } 225 = 100\left(1+\frac{r}{100}\right)^2$

$\text{or } \frac{225}{100} = \left[1+\frac{r}{100}\right]^2$

$\text{or } 1+\frac{r}{100} = \frac{15}{10}$

$\text{or } \frac{100+r}{100} = \frac{15}{10}$

or 100 + r = 150

or r = 50%

Aliter : Using Rule 8,

Here, n = 2.25, t = 2 years

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

$R\% = \left[(2.25)^{\frac{1}{2}} - 1\right] \times 100\%$

$= [1.5 - 1] \times 100\%$

$= 0.5 \times 100\%$

$= 50\%$

2. (2) A sum of ₹ x becomes ₹ 2x in 4 years.

Similarly, ₹ 2x will become 2 × 2x = ₹ 4x in next 4 years and ₹ 4x will become 2 × 4x = ₹ 8x in yet another 4 years. So, the total time = 4 + 4 + 4 = 12 years

Aliter : Using Rule 5,

Here, m = 2, t = 4

Time taken to become

2^3 = n × t years

= 3 × 4 = 12 years

Note : If a sum of money becomes n times in t years, it will become $t^1 = n^x$ times at the same rate of interest in t^1 years given by,

$\boxed{t^1 = xt}$

3. (2) Let the sum be x which becomes 2x in 10 years. Hence, 4x in 20 years

Method 2 :

Unitary Method can also be used.

Aliter : Using Rule 5,

Here, m = 2, t = 10

Time taken to become 4 times = 2^2 times

= t × n = 10 × 2 = 20 years

4. (1) Let the principal be *x* and the rate of compound interest be *r*% per annum. Then,

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

$\Rightarrow 8 = \left(1+\frac{r}{100}\right)^3 \Rightarrow 2^3 = \left(1+\frac{r}{100}\right)^3$

$\Rightarrow 2 = 1+\frac{r}{100}$

$\Rightarrow \frac{r}{100} = 1 \Rightarrow r = 100\%$

Aliter : Using Rule 8,

Here, n = 8, t = 3 years.

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

$= \left[(8)^{\frac{1}{3}} - 1\right] \times 100\%$

$= \left[\left(2^3\right)^{\frac{1}{3}} - 1\right] \times 100\%$

$= 100\%$

5. (3) Let the sum be *x*.

Then,

$2x = x\left(1+\frac{r}{100}\right)^6$

$\Rightarrow 2 = \left(1+\frac{r}{100}\right)^6$

Cubing both sides,

$8 = \left\{\left(1+\frac{r}{100}\right)^6\right\}^3$

$\Rightarrow 8 = \left(1+\frac{r}{100}\right)^{18}$

$\Rightarrow 8x = x\left(1+\frac{r}{100}\right)^{18}$

$\therefore$ The sum will be 8 times in 18 years. i.e., Time = 18 years

Aliter : Using Rule 5,

Here, m = 2, t = 6 years

It will becomes 8 times of itself = 2^3 times of it self

in t × n years = 6 × 3 = 18 years

6. (2) Let the Principal be P and rate of interest be *r*%.

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

$\Rightarrow 2 = \left(1+\frac{r}{100}\right)^5 \quad \ldots(i)$

On cubing both sides,

$8 = \left(1+\frac{r}{100}\right)^{15}$

$\therefore$ Time = 15 years

Aliter : Using Rule 5,

Here, m = 2, t = 5 years

It becomes 8 times = 2^3 times

in t × n = 5 × 3 = 15 years

7. (1) $A = P\left(1+\frac{R}{100}\right)^T$

$2 = 1\left(1+\frac{R}{100}\right)^{15}$

Cubing on both sides, we have

$8 = 1\left(1+\frac{R}{100}\right)^{45}$

Required time = 45 years
Aliter : Using Rule 5,
Here, m = 2, t = 15 years
It becomes 8 times = 2^3 times
in t × n years= 15 × 3 = 45 years

8. (4) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 24000 = 12000\left(1+\frac{R}{100}\right)^5$

$\Rightarrow 2 = \left(1+\frac{R}{100}\right)^5$

$\Rightarrow 2^4 = \left(1+\frac{R}{100}\right)^{20}$

i.e. The sum amounts to ₹ 192000 after 20 years.
Aliter : Using Rule 11
Here, x = 2, n_1 = 5
y = ?, n_2 = 20

$x^{\frac{1}{n_1}} = y^{\frac{1}{n}}$

$2^{\frac{1}{5}} = y^{\frac{1}{20}}$

$\Rightarrow y = \left(2^{\frac{1}{5}}\right)^{20}$

$y = 2^4$
$y = 16$ times
$\therefore$ Sum = 16 × 12000
= ₹ 1,92,000

9. (1) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 4 = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow 1 + \frac{R}{100} = 2$

$\Rightarrow \frac{R}{100} = 1$

$\Rightarrow$ R = 100%
Aliter : Using Rule 8,
Here, n = 4, t = 2 years

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

$= \left[(4)^{\frac{1}{2}} - 1\right]\times 100\%$

= 100%

10. (2) $A = P\left(1+\frac{R}{100}\right)^T$

Let P. ₹, A = ₹ 2

$\Rightarrow 2 = 1\left(1+\frac{R}{100}\right)^3$

On squaring both sides.

$4 = 1\left(1+\frac{R}{100}\right)^6$

$\therefore$ Time = 6 years
Aliter : Using Rule 11,
Here, x = 2, n_1 = 3
y = 4, n_2 = ?

$x^{\frac{1}{n_1}} = y^{\frac{1}{n_2}}$

$2^{\frac{1}{3}} = 4^{\frac{1}{n_2}}$

$2^{\frac{1}{3}} = \left(2^2\right)^{\frac{1}{n_2}}$

$\Rightarrow 2^{\frac{1}{3}} = 2^{\frac{2}{n_2}}$

$\frac{1}{3} = \frac{2}{n_2}$

$\therefore n_2$ = 6 Years

11. (2) Let the principal be ₹ 1.

$\therefore A = P\left(1+\frac{R}{100}\right)^T$

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

$\Rightarrow 2^3 = \left(1+\frac{R}{100}\right)^3$

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

$\Rightarrow 2^4 = \left(1+\frac{R}{100}\right)^4$

$\therefore$ Time = 4 years
Aliter : Using Rule 11,
Here, x = 8, n_1 = 3
y = 16, n_2 = ?

Using $x^{\frac{1}{n_1}} = y^{\frac{1}{n_2}}$

$(8)^{\frac{1}{3}} = (16)^{\frac{1}{n_2}}$

$\left(2^3\right)^{\frac{1}{3}} = \left(2^4\right)^{\frac{1}{n_2}}$

$2^1 = 2^{\frac{4}{n_2}}$

$\Rightarrow 1 = \frac{4}{n_2}$

n_2 = 4 years

12. (3) $A = P\left(1+\frac{R}{100}\right)^T$

Let P be ₹ 1, then A = ₹ 2

$\Rightarrow 2 = 1\left(1+\frac{R}{100}\right)^4$

$\Rightarrow 2^2 = \left(1+\frac{R}{100}\right)^8$

$\therefore$ Time = 8 years
Aliter : Using Rule 11,
Here, x = 2, n_1 = 4
y = 4, n_2 = ?

Using $x^{\frac{1}{n_1}} = y^{\frac{1}{n_2}}$

$(2)^{\frac{1}{4}} = (4)^{\frac{1}{n_2}}$

$2^{\frac{1}{4}} = \left(2^2\right)^{\frac{1}{n_2}}$

$2^{\frac{1}{4}} = 2^{\frac{1}{n_2}}$

$\Rightarrow \frac{1}{4} = \frac{2}{n_2}$

n_2 = 8 years

13. (3) $A = P\left(1+\frac{R}{100}\right)^T$

Let P = ₹ 1, then A = ₹ 3

$\Rightarrow 3 = 1\left(1+\frac{R}{100}\right)^3$

On squaring both sides,

$9 = 1\left(1+\frac{R}{100}\right)^6$

$\therefore$ Time = 6 years

Aliter : Using Rule 11,

Here, x = 3, n_1 = 3

y = 9, n_2 = ?

Using, $x^{\frac{1}{n_1}} = y^{\frac{1}{n_2}}$

$(3)^{\frac{1}{3}} = (9)^{\frac{1}{n_2}}$

$3^{\frac{1}{3}} = \left(3^2\right)^{\frac{1}{n_2}}$

$3^{\frac{1}{3}} = 3^{\frac{2}{n_2}}$

$\Rightarrow \frac{1}{3} = \frac{2}{n_2}$

$\Rightarrow n_2 = 6$ years

14. (3) If principal = ₹ 1000, amount = ₹ 1331

$\therefore A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow \frac{1331}{1000} = \left(1+\frac{R}{100}\right)^3$

$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(1+\frac{R}{100}\right)^3$

$\Rightarrow 1+\frac{R}{100} = \frac{11}{10}$

$\Rightarrow \frac{R}{100} = \frac{1}{10}$

$\Rightarrow R = \frac{1}{10}\times 100 = 10\%$

Aliter : Using Rule 8,

Here, n = 1.331, t = 3 years

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

$= \left[(1.331)^{\frac{1}{3}} - 1\right]\times 100\%$

$= [1.1 - 1] \times 100\%$

$= 0.1 \times 100\%$

$= 10\%$

15. (4) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 1.44P = P\left(1+\frac{R}{100}\right)^2$

$\Rightarrow (1.2)^2 = \left(1+\frac{R}{100}\right)^2$

$\Rightarrow 1+\frac{R}{100} = 1.2$

$\Rightarrow R = 0.2 \times 100 = 20\%$

Aliter : Using Rule 8,

Here, n = 1.44, t = 2 years

$R\% = \left(n^{\frac{1}{6}} - 1\right)\times 100\%$

$= \left[(1.44)^{\frac{1}{2}} - 1\right]\times 100\%$

$= [(1.2) - 1] \times 100\%$

$= 0.2 \times 100\%$

$= 20\%$

16. (2) $A = P\left(1+\frac{R}{100}\right)^T$

$\Rightarrow \frac{27}{8}x = x\left(1+\frac{R}{100}\right)^3$

$\Rightarrow \left(\frac{3}{2}\right)^3 = \left(1+\frac{R}{100}\right)^3$

$\Rightarrow 1+\frac{R}{100} = \frac{3}{2}$

$\Rightarrow \frac{R}{100} = \frac{3}{2} - 1 = \frac{1}{2}$

$\Rightarrow R = \frac{1}{2}\times 100$

$\therefore R = 50\%$

Aliter :

$n = \frac{27}{8}$, t = 3 years

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

$= \left[\left(\frac{27}{8}\right)^{\frac{1}{3}} - 1\right]\times 100\%$

$= \left[\left(\frac{3}{2}\right) - 1\right]\times 100\%$

$= 50\%$

TYPE-V

1. (1) Let the rate of interest be *r*% per annum,

According to the question,

$4840 = P\left(1+\frac{r}{100}\right)^2$ ..... (i)

and $5324 = P\left(1+\frac{r}{100}\right)^3$ ....(ii)

On dividing equation (ii) by equation (i), we have,

$1 + \frac{r}{100} = \frac{5324}{4840} = 1+\frac{484}{4840}$

$\Rightarrow \frac{r}{100} = \frac{484}{4840}$

$\Rightarrow r = 10\%$

Aliter : Using Rule 7 (i),

Here, b – a = 3 – 2 = 1

B = Rs 5,324, A = 4,840

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

$= \left(\frac{5324}{4840} - 1\right)\times 100\%$

$= \left(\frac{5324-4840}{4840}\right)\times 100\%$

$= \frac{484}{4840}\times 100\% = 10\%$

2. (4) Let the rate of interest = R% per annum.

We know that

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

$2420 = P\left(1+\frac{R}{100}\right)^2$ ....(i)

$2662 = P\left(1+\frac{R}{100}\right)^3$ ...(ii)

Dividing equation (ii) by (i),

$$1+\frac{R}{100}=\frac{2662}{2420}$$

$$\Rightarrow \frac{R}{100}=\frac{2662}{2420}-1$$

$$\Rightarrow \frac{R}{100}=\frac{2662-2420}{2420}=\frac{242}{2420}=\frac{1}{10}$$

$$\Rightarrow R=\frac{1}{10}\times 100=10\%$$

Aliter : Using Rule 7(i),
Here, b – a = 3 – 2 = 1
B = Rs. 2,662, A= Rs,2,420

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

$$= \left(\frac{2662}{2420}-1\right)\times 100\%$$

$$= \left[\frac{2662-2420}{2420}\right]\times 100\%$$

$$= \frac{242}{2420}\times 100\%$$

$$= 10\%$$

3. (1) $A = P\left(1+\frac{R}{100}\right)^T$

$$\therefore \ 3840 = P\left(1+\frac{R}{100}\right)^4 \ldots.(i)$$

$$3936 = P\left(1+\frac{R}{100}\right)^5 \ldots(ii)$$

Dividing equation (ii) by equation (i),

$$\frac{3936}{3840}=1+\frac{R}{100}$$

$$\Rightarrow \frac{R}{100}=\frac{3936}{3840}-1$$

$$= \frac{3936-3840}{3840}=\frac{96}{3840}$$

$$\Rightarrow R=\frac{96}{3840}\times 100=2.5\%$$

Aliter : Using Rule 7(i),
Here, b – a = 5 – 4 = 1
B = Rs. 3,936, A = Rs. 3,840

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

$$= \left(\frac{3936}{3840}-1\right)\times 100\%$$

$$= \left(\frac{3936-3840}{3840}\right)\times 100\%$$

$$= \frac{96}{3840}\times 100\%$$

$$= \frac{10}{4}\% = 2.5\%$$

4. (4) If the principal be ₹ P, then

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

$$\Rightarrow 1440 = P\left(1+\frac{r}{100}\right)^2 \ldots(i)$$

and $1728 = P\left(1+\frac{r}{100}\right)^3 \ldots(ii)$

On dividing equation (ii) by (i),

$$\frac{1728}{1440} = 1 + \frac{r}{100}$$

$$\therefore \ \frac{r}{100}=\frac{1728}{1440}-1$$

$$= \frac{1728-1440}{1440}=\frac{288}{1440}$$

$$\Rightarrow r=\frac{288\times 100}{1440}$$

$\therefore r$ = 20% per annum

Aliter : Using Rule 7(i),
Here, b – a = 3 – 2 = 1
B = Rs 1728, A = Rs,1440

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

$$= \left(\frac{1728}{1440}-1\right)\times 100\%$$

$$= \left(\frac{1728-1440}{1440}\right)\times 100\%$$

$$= \left[\frac{288}{1440}\right]\times 100\% = 20\%$$

5. (4) Difference = 238.50 – 225
= ₹ 13.50
= S.I. on ₹ 225 for 1 year

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

$$= \frac{13.50\times 100}{225\times 1} = 6\% \text{ per annum}$$

Aliter : Using Rule 7(i),
Here, b – a = 1
B = Rs 238.50, A = Rs,225

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

$$= \left(\frac{238.50}{225}-1\right)\times 100\%$$

$$= \left(\frac{238.50-225}{225}\right)\times 100\%$$

$$= \left[\frac{13.5}{225}\right]\times 100\% = 6\%$$

6. (2) $A = P\left(1+\frac{R}{100}\right)^T$

$$\Rightarrow 7000 = P\left(1+\frac{R}{100}\right)^4 \ldots.(i)$$

$$10000 = P\left(1+\frac{R}{100}\right)^8 \ldots\ldots.(ii)$$

Dividing equation (ii) by (i)

$$\frac{10000}{7000} = \left(1+\frac{R}{100}\right)^4$$

$$\Rightarrow \frac{10}{7} = \left(1+\frac{R}{100}\right)^4$$

From equation (i),

$$7000 = P\times\frac{10}{7}$$

$\Rightarrow$ P = ₹ 4900

Aliter : Using Rule 7(iii),
Here, b – a = 8 – 4 = 4
B = Rs 10,000, A = Rs,7000

$$R\% = \left[\left(\frac{B}{A}\right)^{\frac{1}{n}}-1\right]\times 100\%$$

$$R\% = \left[\left(\frac{10000}{7000}\right)^{\frac{1}{4}}-1\right]$$

$$= \left[\left(\frac{10}{7}\right)^{\frac{1}{4}}-1\right]$$

$$\Rightarrow 1+\frac{R}{100} = \left(\frac{10}{7}\right)^{\frac{1}{4}}$$

$$\left(1+\frac{R}{100}\right)^4 = \frac{10}{7}$$

$$7000 = P \times \frac{10}{7}$$

$\because$ Amount $= P\left(1+\frac{R}{100}\right)^4$

P = Rs. 4900

7. (3) Interest on ₹ 650 for 1 year
= 676 – 650 = ₹ 26

So, $r = \frac{26}{650} \times 100$

$\Rightarrow$ r = 4% per annum

$$P = \frac{A}{\left[1+\frac{r}{100}\right]^t} = \frac{650}{\left[1+\frac{4}{100}\right]^1}$$

$$= \frac{650}{\frac{26}{25}} = 650 \times \frac{25}{26} = ₹\ 625$$

Aliter : Using Rule 7(i),
Here, b – a = 1
B = Rs 676, A = ₹ 650

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

$$= \left[\frac{676}{650}-1\right]\times 100\%$$

$$= \left[\frac{676-650}{650}\right]\times 100\%$$

$$= \frac{26}{650}\times 100\%$$

$$= \frac{100}{25} = 4\%$$

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^1$$

$$650 = P\left(1+\frac{4}{100}\right)$$

$$\Rightarrow P = \frac{650\times 100}{104} = ₹\ 625$$

Note : A sum at a rate of interest compounded yearly becomes ₹ A, in n years and ₹ A_2 in (n + 1) years,

then $P = A_1\left(\frac{A_1}{A_2}\right)^n$

8. (1) S.I. on ₹ 2400 for 1 year
= ₹ (2, 520 – 2, 400) = ₹ 120

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

$$= \frac{120\times 100}{2400\times 1} = 5\%$$

Aliter : Using Rule 7(i),
Here, b – a = 4 – 3 = 1
B = Rs 2520, A = ₹ 2400

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

$$= \left[\frac{2520}{2400}-1\right]\times 100\%$$

$$= \left[\frac{2520-2400}{2400}\right]\times 100\%$$

$$= \frac{120}{2400}\times 100\%$$

$$= 5\%$$

9. (3) $P\left(1+\frac{r}{100}\right)^2 = 4500$ ...(i)

$P\left(1+\frac{r}{100}\right)^4 = 6750$ .....(ii)

On dividing equation (ii) by equation (i), we get

$$\left(1+\frac{r}{100}\right)^2 = \frac{6750}{4500}$$

From equation (i),

$$P\times\frac{6750}{4500} = 4500$$

$$\Rightarrow P = \frac{4500\times 4500}{6750} = ₹\ 3{,}000$$

Aliter : Using Rule 7(ii),
Here, b – a = 4 – 2 = 2
B = ₹ 6750, A = ₹ 4500

$$R\% = \left[\left(\frac{B}{A}\right)^{\frac{1}{2}}-1\right]\times 100\%$$

$$= \left[\left(\frac{6750}{4500}\right)^{\frac{1}{2}}-1\right]\times 100\%$$

$$= \left[\left(\frac{3}{2}\right)^{\frac{1}{2}}-1\right]\times 100\%$$

$$\Rightarrow \left(\frac{3}{2}\right)^{\frac{1}{2}} = 1+\frac{R}{100}$$

$$\Rightarrow \frac{3}{2} = \left(1+\frac{R}{100}\right)^2$$

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

$$4500 = P\times\frac{3}{2}$$

P = ₹ 3000

10. (4) Principal = ₹ P (let)
Rate = R% per annum

$$\therefore A = P\left(1+\frac{R}{100}\right)^T$$

$$\Rightarrow 650 = P\left(1+\frac{R}{100}\right)$$

$$\Rightarrow \frac{650}{P} = \left(1+\frac{R}{100}\right) \text{ ...(i)}$$

Again, $676 = P\left(1+\frac{R}{100}\right)^2$

$$\Rightarrow 676 = P\left(\frac{650}{P}\right)^2$$

$$= \frac{P\times 650\times 650}{P^2}$$

$$\Rightarrow P = \frac{650\times 650}{676} = ₹\ 625$$

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

$$= \frac{350\times 100}{2\times 4} = \text{Rs. } 4375$$

$$\text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^T-1\right]$$

$$= 4375\left[\left(1+\frac{4}{100}\right)^2-1\right]$$

$$= 4375\left[\left(1+\frac{1}{25}\right)^2-1\right]$$

$$= 4375\left[\left(\frac{26}{25}\right)^2-1\right]$$

$$= 4375\left(\frac{676}{625}-1\right)$$

$$= \frac{4375\times 51}{625}$$

= Rs. 357
Required difference
= Rs. (357 – 350) = Rs. 7

12. (1) Rate of interest = 12% p.a.
= 1% per month
Time = 12y months

$$\therefore A = P\left(1+\frac{R}{100}\right)^T$$

$$\Rightarrow 64 = 1\left(1+\frac{1}{100}\right)^{12y}$$

$$\Rightarrow 64 = 1(1.01)^{12y}$$

13. (3) C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 525 = P\left[\left(1+\frac{10}{100}\right)^2 - 1\right]$

$\Rightarrow 525 = P\left(\frac{121}{100} - 1\right)$

$\Rightarrow 525 = \frac{P \times 21}{100}$

$\Rightarrow P = \frac{525 \times 100}{21}$ = Rs. 2500

Again, new rate = 5% per annum

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

$= \frac{2500 \times 5 \times 4}{100}$ = Rs. 500

14. (2) Let the principal be Rs. *x*.

When the interest is compounded annually,

C.I. $= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$

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

$= P\left[\left(\frac{6}{5}\right)^2 - 1\right]$

$= P\left(\frac{36}{25} - 1\right) = \text{Rs. } \frac{11P}{25}$

When the interest is compounded half-yearly,

C.I. $= P\left[\left(1+\frac{10}{100}\right)^4 - 1\right]$

$= P\left[\left(\frac{11}{10}\right)^4 - 1\right]$

$= P\left(\frac{14641}{10000} - 1\right)$

$= \text{Rs. } \frac{4641P}{10000}$

$\therefore \frac{4641P}{10000} - \frac{11P}{25} = 723$

$\Rightarrow \frac{4641P - 4400P}{10000} = 723$

$\Rightarrow \frac{241P}{10000} = 723$

$\Rightarrow P = \frac{723 \times 10000}{241}$

= Rs. 30000

TYPE-VI

1. (1) A = ₹ 2550

R = 4% per annum

n = 2 years

Let each of the two equal instalments be x

Present worth

$= \frac{\text{Instalment}}{\left(1+\frac{r}{100}\right)^n}$

$P_1 = \frac{x}{\left(1+\frac{4}{100}\right)^1} = \frac{x}{1+\frac{1}{25}} = \frac{x}{\frac{26}{25}}$

or $P_1 = \frac{25}{26}x$

Similarly,

$P_2 = \left(\frac{25}{26}\right)^2 x = \frac{625}{676}x$

$P_1 + P_2 = A$

$\therefore \frac{25}{26}x + \frac{625}{676}x = 2550$

$\Rightarrow \frac{(650+625)x}{676} = 2550$

$\Rightarrow \frac{1275}{676}x = 2550$

$\Rightarrow x = 2550 \times \frac{676}{1275}$

x = ₹ 1352

Aliter : Using Rule 9(i),

Here, P = ₹ 2550, n = 2, r = 4%

Each instalment

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

$= \frac{2550}{\left(\frac{100}{100+4}\right) + \left(\frac{100}{100+4}\right)^2}$

$= \frac{2550}{\frac{100}{104} + \left(\frac{100}{104}\right)^2}$

$= \frac{2550}{\frac{100}{104}\left(1+\frac{100}{104}\right)}$

$= \frac{2550}{\frac{100}{104}\left(\frac{204}{104}\right)}$

$= \frac{2550 \times 104 \times 104}{20400}$ = ₹ 1352

2. (2) Using Rule 1,

Let principal (present worth) for first year be P_1 and that for two years be P_2.

$\therefore 16224 = P_1\left(1+\frac{4}{100}\right)$

$\Rightarrow 16224 = P_1\left(1+\frac{1}{25}\right) = \frac{26P_1}{25}$

$\Rightarrow P_1 = \frac{16224 \times 25}{26}$ = ₹ 15600

Again,

$16224 = P_2\left(1+\frac{4}{100}\right)^2$

$\Rightarrow 16224 = P_2\left(\frac{26}{25}\right)^2 = \frac{676\,P_2}{625}$

$\Rightarrow P_2 = \frac{16224 \times 625}{676}$ = ₹ 15000

$\therefore$ Cash value of the scooter

= ₹ (16224 + 15600 + 15000)

= ₹ 46824

3. (3) Let the annual instalment be *x*

$A = P\left(1+\frac{R}{T}\right)^T$

$x = P_1\left(1+\frac{25}{200}\right)$

$\Rightarrow x = P_1 \times \frac{9}{8}$

$\Rightarrow P_1 = \frac{8}{9}x$

Similarly, $P_2 = \frac{64}{81}x$

$P_1 + P_2 = 6800$

$\Rightarrow \frac{8}{9}x + \frac{64}{81}x = 6800$

$\Rightarrow \frac{72x + 64x}{81} = 6800$

$\Rightarrow \frac{136x}{81} = 6800$

$\Rightarrow x = \frac{6800 \times 81}{136}$ = ₹ 4050

Aliter : Using Rule 9(i),

Here, P = ₹ 6800, R = $\frac{25}{2}$%

n = 2

Each instalment

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

$$= \frac{6800}{\left(\frac{100}{100+\frac{25}{2}}\right)+\left(\frac{100}{100+\frac{25}{2}}\right)^2}$$

$$= \frac{6800}{\frac{200}{225}+\left(\frac{200}{225}\right)^2}$$

$$= \frac{6800}{\frac{200}{225}\left(1+\frac{200}{225}\right)}$$

$$= \frac{6800\times 225\times 225}{200\times 425} = ₹\ 4050$$

4. (2) Using Rule 9(i),
Let each instalment be x.

$$\therefore \frac{x}{\left(1+\frac{5}{100}\right)}+\frac{x}{\left(1+\frac{5}{100}\right)^2}=12300$$

$$\Rightarrow \frac{20x}{21}+\left(\frac{20}{21}\right)^2 x = 12300$$

$$\Rightarrow \frac{20x}{21}\left(1+\frac{20}{21}\right)=12300$$

$$\Rightarrow \frac{20x}{21}\times\frac{41}{21}\times x = 12300$$

$$\Rightarrow x = \frac{12300\times 21\times 21}{20\times 41}$$

$\therefore x = ₹\ 6615$

5. (2) Using Rule 9(i),
Let the value of each instalment be ₹ x
$\therefore$ Principal = Present worth of ₹ x due 1 year hence, present worth of Rs. x due 2 years hence

$$\Rightarrow 210 = \frac{x}{\left(1+\frac{R}{100}\right)}+\frac{x}{\left(1+\frac{R}{100}\right)^2}$$

$$\Rightarrow 210 = \frac{x}{\left(1+\frac{10}{100}\right)}+\frac{x}{\left(1+\frac{10}{100}\right)^2}$$

$$\Rightarrow 210 = \frac{x}{1+\frac{1}{10}}+\frac{x}{\left(1+\frac{1}{10}\right)^2}$$

$$\Rightarrow 210 = \frac{x}{\frac{11}{10}}+\frac{x}{\left(\frac{11}{10}\right)^2}$$

$$\Rightarrow 210 = \frac{10x}{11}+\frac{100x}{121}$$

$$\Rightarrow 210 = \frac{110x+100x}{121}$$

$$\Rightarrow 210\times 121 = 210\,x$$

$$\Rightarrow x = \frac{210\times 121}{210} = ₹\ 121$$

6. (3) Using Rule 1,
Share of elder brother
= Rs. x (let)
$\therefore$ Share of younger brother
= Rs. $(16820 - x)$

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

According to the question,

$$x\left(1+\frac{5}{100}\right)^{13}$$

$$= (16820 - x)\left(1+\frac{5}{100}\right)^{15}$$

$$\Rightarrow x = (16820 - x)\left(1+\frac{1}{20}\right)^2$$

$$\Rightarrow x = (16820 - x)\left(\frac{21}{20}\right)^2$$

$$\Rightarrow \left(\frac{20}{21}\right)^2 x = 16820 - x$$

$$\Rightarrow \frac{400x}{441} + x = 16820$$

$$\Rightarrow \frac{400x+441x}{441} = 16820$$

$$\Rightarrow 841x = 16820\times 441$$

$$\Rightarrow x = \frac{16820\times 441}{841} = \text{Rs. } 8820$$

7. (1) Using Rule 9(i),
Sum borrowed = Present worth of Rs. 17640 due 1 year hence + Present worth of Rs. 17640 due 2 years hence

$$= \text{Rs.}\left(\frac{17640}{\left(1+\frac{5}{100}\right)}+\frac{17640}{\left(1+\frac{5}{100}\right)^2}\right)$$

$$= \text{Rs.}\left(17640\times\frac{20}{21}+17640\times\frac{20}{21}\times\frac{20}{21}\right)$$

= Rs. (16800 + 16000)
= Rs. 32800

8. (3) Using Rule 1,
Let the amount deposited in Post Office be Rs. x lakhs.
$\therefore$ Amount deposited in bank = Rs. $(3 - x)$ lakhs
According to the question,

$$\frac{x\times 10\times 1}{100\times 12}+\frac{(3-x)\times 6\times 1}{100\times 12}$$

$$= \frac{2000}{100000} = \frac{1}{50}$$

$$\Rightarrow 10x + 18 - 6x = \frac{1}{50}\times 1200$$

$= 24$

$\Rightarrow 4x = 24 - 18 = 6$

$$\Rightarrow x = \frac{6}{4} = \text{Rs. } \frac{3}{2} \text{ lakhs}$$

$\therefore$ Required difference = 0

9. (2) Using Rule 1,
Let the income of company in 2010 be Rs. P
According to the question,

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

$$\Rightarrow 2664000 = P\left(1+\frac{20}{100}\right)^2$$

$$\Rightarrow 2664000 = P\left(1+\frac{1}{5}\right)^2$$

$$\Rightarrow 2664000 = P\times\left(\frac{6}{5}\right)^2$$

$$\Rightarrow P = \frac{2664000\times 5\times 5}{6\times 6}$$

= Rs. 1850000

TYPE-VII

1. (2) Using Rule 1,

$$\text{S.I.} = \frac{6000\times 5\times 2}{100} = ₹\ 600$$

$$\text{C.I.} = 5000\left[\left(1+\frac{8}{100}\right)^2 - 1\right]$$

$$= 5000\left[\left(\frac{27}{25}\right)^2 - 1\right]$$

$$= 5000\left[\left(\frac{729-625}{625}\right)\right]$$

$$= 5000\times\frac{104}{625} = ₹\ 832$$

$\therefore$ Required difference
= ₹ (832–600) = ₹ 232

2. (3) Using Rule 1,
Let the borrowed amount be x
According to the question,

$$x\left[\left(1+\frac{3}{100}\right)^2-1\right]-\frac{x\times4\times1}{100}$$

$= 104.50$

[$\because$ Interest is compounded half yearly]

$\Rightarrow x\,[(1.03)^2 - 1] - 0.04x$

$= 104.50$

$\Rightarrow 0.0609x - 0.04x = 104.50$

$\Rightarrow 0.0209x = 104.5$

$$\Rightarrow x = \frac{104.5}{0.0209} = ₹\ 5000$$

3. (2) Using Rule 9(i),
Let each instalment be x.

$$\frac{x}{\left(1+\frac{35}{400}\right)^2}+\frac{x}{\left(1+\frac{35}{400}\right)}=13360$$

$$\Rightarrow \frac{x}{\left(1+\frac{7}{80}\right)^2}+\frac{x}{\left(1+\frac{7}{80}\right)}=13360$$

$$\Rightarrow \frac{6400\,x}{7569}+\frac{80\,x}{87}=13360$$

$$\Rightarrow \frac{6400\,x+6960\,x}{7569}=13360$$

$\Rightarrow 13360\,x = 13360 \times 7569$

$\Rightarrow x = ₹\ 7569$

4. (3) Using Rule 1,
Rate = 5%, Time
= 4 half years
P = ₹ 5000

$$\therefore \text{ C.I.} = P\left[\left(1+\frac{R}{100}\right)^T-1\right]$$

$$= 5000\left[\left(1+\frac{5}{100}\right)^4-1\right]$$

$$= 5000\left(\frac{194481}{160000}-1\right)$$

$$= \frac{5000\times34481}{160000} = ₹\ 1077.5$$

$$\text{S.I.} = \frac{5000\times10\times2}{100} = ₹\ 1000$$

Difference = 1077.5 – 1000
= ₹ 77.5

5. (2) Using Rule 3,

$$A = P\left(1+\frac{R_1}{100}\right)^{T_1}\left(1+\frac{R_2}{100}\right)^{T_2}$$

$$= 250\left(1+\frac{4}{100}\right)\left(1+\frac{8}{100}\right)$$

$$= 250\times\frac{104}{100}\times\frac{108}{100}$$

$\therefore$ A = ₹ 280.80

6. (1) Using Rule 1,
Amount given to sons

$$= 84100\times\frac{1}{2} = ₹\ 42050$$

Amount given to B = ₹ x (let)
$\therefore$ Amount given to A
= ₹ (42050 – x)

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

$$\Rightarrow (42050-x)\left(1+\frac{R}{100}\right)^3$$

$$= x\left(1+\frac{R}{100}\right)^5$$

$$\Rightarrow (42050-x) = x\left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow (42050-x) = x\left(1+\frac{5}{100}\right)^2$$

$$\Rightarrow (42050-x) = x\left(1+\frac{1}{20}\right)^2$$

$$\Rightarrow 42050-x = x\left(\frac{21}{20}\right)^2$$

$$\Rightarrow 42050-x = \frac{441x}{400}$$

$$\Rightarrow 42050 = \frac{441x}{400}+x$$

$$\Rightarrow 42050 = \frac{441x+400x}{400}$$

$$= \frac{841x}{400}$$

$\Rightarrow 841\,x = 42050 \times 400$

$$\Rightarrow x = \frac{42050\times400}{841}$$

= ₹ 20,000

7. (2) Using Rule 1,

$$\text{Time} = \frac{3}{2}\text{ years}$$

= 3 half years
Rate = 2R% per annum
= R% per half year
$\therefore$ Amount

$$= \text{Principal} - \left(1+\frac{\text{Rate}}{100}\right)^{\text{Time}}$$

$$\Rightarrow 2315.25 = 2000\left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow \frac{231525}{200000} = \left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow \frac{9261}{8000} = \left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow \left(1+\frac{1}{20}\right)^3 = \left(1+\frac{R}{100}\right)^3$$

$$\Rightarrow 1+\frac{1}{20} = 1+\frac{R}{100}$$

$$\Rightarrow \frac{R}{100} = \frac{1}{20}$$

$$\Rightarrow R = \frac{100}{20}$$

= 5% per half year
$\therefore$ Required rate
= 10% per annum

8. (4) $A = P\left(1+\frac{R}{100}\right)^n$

$$\Rightarrow 2P = P\left(1+\frac{R}{100}\right)^5$$

On cubing both sides,

$$2^3 = \left(1+\frac{R}{100}\right)^{5\times3}$$

$$\Rightarrow 8 = 1\left(1+\frac{R}{100}\right)^{15}$$

$\therefore$ Required time = 15 years
Aliter : Using Rule 11,
$x = 2$, $n_1 = 5$, $y = 8$, $n_2 = ?$

Here, $x^{\frac{1}{n_1}} = y^{\frac{1}{n_2}}$

$$(2)^{\frac{1}{5}} = (8)^{\frac{1}{n_2}}$$

$$2^{\frac{1}{5}} = (2)^{\frac{3}{n_2}}$$

$$\Rightarrow \quad \frac{1}{5} = \frac{3}{n_2}$$

$$\therefore \quad n_2 = 15$$

9. (4) Using Rule 1,
When the interest is payable half yearly,
= 9% per half annum
Time = 4 half years
Let the principal be Rs. P.

$$\therefore \text{ C.I.} = P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$= P\left[\left(1+\frac{9}{100}\right)^4 - 1\right]$$

$$= P\left[(1.09)^4 - 1\right]$$

= P [1.4116 – 1] = Rs. 0.4116 P
According to the question,

$$= P\left[\left(1+\frac{18}{100}\right)^2 - 1\right]$$

$$= P\left[(1.18)^2 - 1\right]$$

= P (1.3924 – 1) = Rs. 0.3924 P
According to the question,
0.4116P – 0.3924P = 960

$$\Rightarrow \text{ 0.0192P} = 960$$

$$\Rightarrow \text{ P} = \frac{960}{0.0192}$$

$$= \frac{960 \times 10000}{192}$$

= Rs. 50000

10. (3) Using Rule 3,
Amount

$$= P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)$$

$$= 25000\left(1+\frac{4}{100}\right)\left(1+\frac{5}{100}\right)$$

$$= 25000 \times \frac{104}{100} \times \frac{105}{100}$$

= Rs. 27300

11. (3) $A = P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)$

$$= 10000\left(1+\frac{10}{100}\right)\left(1+\frac{12}{100}\right)$$

$$= 10000 \times \frac{110}{100} \times \frac{112}{100}$$

= Rs. 12320

12. (1) Let the principal be Rs. P and rate of interest be R% per annum.

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

$$\Rightarrow 1400 = \frac{PR \times 2}{100}$$

$$\Rightarrow \text{ PR} = 1400 \times 50$$

= 70000 ..... (i)
Again, for 2 years,

$$\text{C.I.} - \text{S.I.} = \frac{PR^2}{10000}$$

$$\Rightarrow 1449 - 1400 = \frac{PR^2}{10000}$$

$$\Rightarrow 49 = \frac{PR \times R}{10000}$$

$$\Rightarrow 49 = \frac{70000 \times R}{10000}$$

[From equation (i)]

$$\Rightarrow \text{ 7R} = 49$$

$$\Rightarrow \text{ R} = \frac{49}{7} = 7\% \text{ per annum}$$

13. (3) $P = \frac{x_1}{1+\frac{R}{100}} + \frac{x_2}{\left(1+\frac{R}{100}\right)^2}$

$$= \text{Rs.}\left(\frac{3150}{1+\frac{5}{100}} + \frac{4410}{\left(1+\frac{5}{100}\right)^2}\right)$$

$$= \text{Rs.}\left(\frac{3150}{1+\frac{1}{20}} + \frac{4410}{\left(1+\frac{1}{20}\right)^2}\right)$$

$$= \text{Rs.}\left(\frac{3150}{\frac{21}{20}} + \frac{4410}{\left(\frac{21}{20}\right)^2}\right)$$

$$= \text{Rs.}\left(\frac{3150 \times 20}{21} + \frac{4410 \times 400}{441}\right)$$

= Rs. (3000 + 4000)
= Rs. 7000

14. (2) Let Ram's share be Rs. x.
∴ Shyam's share
= Rs. (260200 – x)

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

$$\Rightarrow x\left(1+\frac{R}{100}\right)^4$$

$$= (260200 - x)\left(1+\frac{R}{100}\right)^6$$

$$\Rightarrow x = (260200 - x)\left(1+\frac{4}{100}\right)^2$$

$$\Rightarrow x = (260200 - x)\left(1+\frac{1}{25}\right)^2$$

$$\Rightarrow x = (260200 - x)\left(\frac{26}{25}\right)^2$$

$$\Rightarrow x = (260200 - x)\frac{676}{625}$$

$$\Rightarrow \frac{625x}{676} + x = 260200$$

$$\Rightarrow \frac{625x + 676x}{676} = 260200$$

$$\Rightarrow \frac{1301x}{676} = 260200$$

$$\Rightarrow x = \frac{260200 \times 676}{1301}$$

= Rs. 135200

15. (3) Interest got by A

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

$$= \frac{5000 \times 2 \times 6}{100} = \text{Rs. } 600$$

C.I. received by B

$$= P\left[\left(1+\frac{R}{100}\right)^T - 1\right]$$

$$= 5000\left[\left(1+\frac{10}{100}\right)^2 - 1\right]$$

$$= 5000\left[\left(\frac{11}{10}\right)^2 - 1\right]$$

$$= 5000\left(\frac{121}{100} - 1\right)$$

$$= \frac{5000 \times 21}{100} = \text{Rs. } 1050$$

∴ B's profit
= Rs. (1050 – 600)
= Rs. 450