Chapter-6
Compound Interest

WS-1

Q1: P = ₹25000
R = 12% p.a.
T = 3 yrs

For first year

P = ₹25000
R = 12% p.a.
T = 3 yrs

$SI = \frac{P \times R \times T}{100}$

$= \frac{25000 \times 12 \times 1}{100}$

= ₹3000

Amount = 25000 + 3000
= ₹28000

For second year

P = ₹28000
R = 12% p.a
T = 1 year

$SI = \frac{P \times R \times T}{100} = \frac{28000 \times 12 \times 1}{100}$

= ₹ 3360

Amt = ₹28000 + 3360
= ₹31360

For third year

P = ₹31360
R = 12%
T = 1 year

$SI = \frac{P \times R \times T}{100} = \frac{31360 \times 12 \times 1}{100}$

= ₹3763.2

Amt = 31360 + 3763.2
= ₹35123.2

CI = ₹35123.2 − ₹25000
= ₹10123.2

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

★ CI = A − P

Q2: P = ₹6500
n = 2 yrs
R = 9% p.a.

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

$A = 6500\left(1 + \frac{9}{100}\right)^2$

$= 6500\left(\frac{100 + 9}{100}\right)^2$

$= 6500 \times \left(\frac{109}{100}\right)^2$

$= \frac{6500 \times 109 \times 109}{100 \quad 100}$

A = ₹ 7722.65

CI = A − P
= 7722.65 − 6500
= ₹1222.65

Q4: P = ₹40,000
n = 3 yrs
R = 7% p.a

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

$A = 40,000\left(1+\frac{7}{100}\right)^3$

$= 40000\left(\frac{107}{100}\right)^3$

$= \frac{40,000 \times 107 \times 107 \times 107}{100 \times 100 \times 100}$

$= \frac{4 \times 107 \times 107 \times 107}{100}$

$= ₹\,49001.72$

Q6: $P = ₹\,7,50,000$

$R = 6\%$ p.a.

$n = 3$ yrs

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

$A = 750000\left(1+\frac{6}{100}\right)^3$

$= ₹750000\left(\frac{106}{100}\right)^3$

$= \frac{750000 \times 106 \times 106 \times 106}{100 \times 100 \times 100}$

$= \frac{75 \times 106 \times 106 \times 106}{100}$

106 × 106 = 11236

11236 × 106 = 1191016

1191016 × 75 = 89326200

$= ₹\,893262$

$CI = 893263 - 750000$

$= ₹\,143262$

WS-2

Q1: $P = ₹\,5000$

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

$= 3$ half years

$R = 16\%$ p.a.

$= 8\%$ p.a. half year

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

$= 5000\left(1+\frac{8}{100}\right)^3$

$= 5000\left(\frac{108}{100}\right)^3$

$= \frac{5000 \times 108 \times 108 \times 108}{100 \times 100 \times 100}$

$= \frac{8 \times 27 \times 27 \times 27}{25}$

$= \frac{216 \times 729}{25}$

Q2: CI = ?

P = ₹15625

R = 16% p.a. = $\frac{16}{4}$ 4% P. quater

n = 9 months

= 3 quater

$A = P\left[1+\frac{R}{100}\right]^n$

$= 15625\left[1+\frac{4}{25}\right]^3$

$= 15625\left[\frac{26}{25}\right]^3$

$= \frac{15625}{1} \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$

Amt = ₹17576

CI = 17576 − 15625

= ₹1951

Q3: P = ₹10,000

n = 6 months

= 2 quaters

R = 12% p.a.

$\frac{12}{4}$ = 3% p. quater

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

$= 10,000\left(1+\frac{3}{100}\right)^2$

$= 10,000\left(\frac{103}{100}\right)^2$

$= 10,000 \times \frac{103}{100} \times \frac{103}{100}$

= ₹10609

Q4: For Half yearly

P = ₹25000

R = 16% p.a.

8% p. Quater

n = 6 months

1 half year

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

$25000\left[\left(1+\frac{8}{100}\right)^1 - 1\right]$

$25000\left[\frac{27}{25} - 1\right]$

$\frac{25000}{10,000}\left[\frac{2}{25}\right]$

= ₹2000

for quaterly

P = ₹25000

R = 16% p.a.

$= \frac{16}{4}$ 4% p.a.

n = 6 months

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

$25000\left[\left(1+\frac{4}{100}\right)^2 - 1\right]$

$25000\left[\left(\frac{26}{25}\right)^2 - 1\right]$

$25000\left[\frac{676-625}{625}\right]$

= ₹2040

WS-3

Q1: $P = ₹15000$

$R = 8\%$ p.a.

$n = 2$ years

$$A = P\left[1+\frac{R}{100}\right]^n$$

$$A = 15000\left[1+\frac{8}{100}^{25}\right]^2$$

$$15000\left[1+\frac{25}{25}\right]^2$$

$$15000 \times \left[\frac{25+2}{25}\right]^2$$

$$15000 \times \frac{27}{25} \times \frac{27}{25}$$

$24 \times 27 \times 27$

$= ₹17496$

Q4: $P = ₹7500$

$R = 4\%$ p.a.

$n = 3$ years

$$A = P\left[1+\frac{R}{100}\right]^n$$

$$A = 7500\left[1+\frac{4}{100}\right]^3$$

$$A = 7500\left[1+\frac{1}{25}\right]^3$$

$$= 7500 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= \frac{312 \times 676}{25} = \frac{210912}{25}$$

$$= 8436.48$$

Q5: CI - SI = ?

$P = ₹30,000$

$R = 7\%$

$n = 3$ years

$$SI = \frac{P \times R \times T}{100} = SI = \frac{30,000 \times 7 \times 3}{100}$$

$= 300 \times 7 \times 3$

$= SI = 6300$

$SI = ₹6300$

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

$$CI = 30,000\left[\left(1+\frac{7}{100}\right)^3 - 1\right]$$

$$= 30,000\left[\left(\frac{107}{100}\right)^3 - 1\right]$$

$= 30,000 \left[\frac{107 \times 107 \times 107 - 1}{1000000}\right]$

$= \frac{30,000}{1000000} \left[\frac{1225043 - 1000000}{1}\right]$

$= \frac{3 \times 225043}{100}$

$= 6751.29$

CI - SI

6751.29 - 6300

= ₹451.29

Q6:

Case of Aman

P = ₹14500

R = 11 % p.a.

T = 3 yrs

$SI = \frac{P \times R \times T}{100}$

$= \frac{14500 \times 11 \times 3}{100}$

= ₹4785

Case of Tarun

P = ₹14500

R = 10 % p.a.

n = 3 yrs

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

$CI = 14500\left[\left(1 + \frac{10}{100}\right)^3 - 1\right]$

$14500\left[\frac{1331 - 1000}{1000}\right]$

$\frac{14500 \times 331}{1000}$

= ₹4799.5

Q8: A = ₹2970.25

R = 9 % p.a.

n = 2 yrs

Let principal be = ₹P

$A = P\left[1 + \frac{R}{100}\right]^n$

$2970.25 = P\left[1 + \frac{9}{100}\right]^n$

$2970.25 = P\left[\frac{109}{100}\right]^2$

$\frac{297025}{100} = P \times \frac{109}{100} \times \frac{109}{100}$

$P = \frac{297025 \times 100 \times 100}{100 \quad 109 \quad 109}$

$P = \frac{2725 \times 100}{109}$ (25)

P = ₹2500

Q9: $R = 7\frac{1}{2}$ % p.a

n = 3 years

A = ₹3101.40

Let req. sum be ₹P

$A = P\left[1 + \frac{R}{100}\right]^n$

$3101.40 = P\left[1+\frac{15}{40200}\right]^3$

$3101.40 = P\left[\frac{43}{40}\right]^3$

$3101.40 * P \times \frac{43}{40} \times \frac{43}{40} \times \frac{43}{40}$

$P = \frac{3101.40 \times 40 \times 40 \times 40}{43 \times 43 \times 43 \times 100}$

$P = \frac{198489600}{71507}$

Q9: $R = \frac{7\frac{1}{2}}{2}\% \text{ p.a.} = \frac{15}{2}\% \text{ p.a.}$ ✓

$n = 3$ yrs

$CI = ₹3101.40$

Let req. sum be ₹P

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

$3101.40 = P\left[\left(1+\frac{15}{40200}\right)^3 - 1\right]$

$3101.40 = P\left[\left(\frac{43}{40}\right)^3 - 1\right]$

$\Rightarrow \frac{3101.40}{100} = P\left[\frac{79507 - 1}{64000}\right]$

$\Rightarrow \frac{310140}{100} = P\left[\frac{79507 - 64000}{64000}\right]$

$\Rightarrow \frac{310140}{100} = P\left[\frac{15507}{64000}\right]$

$\Rightarrow \frac{31014 \times 64000}{15507 \times 10}$

$\Rightarrow ₹12800$

Q10: P = ₹640

A = ₹774.40

n = 2 yrs

Let req. rate is R% p.a.

$A = P\left[1+\frac{R}{100}\right]^n$

$\frac{77440}{100} = 640\left[1+\frac{R}{100}\right]^2$

$\frac{7744}{6400} = \left(1+\frac{R}{100}\right)^2$

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

$\left(\frac{11}{10}\right)^2 = \left(1+\frac{R}{100}\right)^2$

$\frac{R}{100} = \frac{11}{10} - 1$

$\frac{R}{100} = \frac{1}{10}$

$R = \frac{100}{10}$ 10·1·

So rate is 10·1· p·a.

Q11: P = ₹64000

A = ₹68921

n = 3 yrs

Let req. rate be R·1· p·a.

$A = P\left[1 + \frac{R}{100}\right]^n$

$68921 = 64000\left[1 + \frac{R}{100}\right]^3$

$\frac{68921}{64000} = \left[1 + \frac{R}{100}\right]^3$

$\left(\frac{41}{40}\right)^3 = \left[1 + \frac{R}{100}\right]^3$

$\frac{R}{100} = \frac{41}{40} - 1$

$\frac{R}{100} = \frac{1}{40}$ $\quad \Rightarrow R = \frac{100}{40} \frac{5}{2}$

$R = \frac{5}{2}$ ·1·

Q13: P = ₹3750

R = 20·1· p·a.

A = ₹6480

$A = P\left[1 + \frac{R}{100}\right]^n$

$6480 = 3750\left[1 + \frac{20^1}{5\cancel{100}}\right]^n$

$\frac{6480}{3750} = \left(\frac{6}{5}\right)^n$

$\left(\frac{6}{5}\right)^3 = \left(\frac{6}{5}\right)^n$

n = 3 yrs

Q14: CI − SI = 46

$R = 6\frac{2}{3}$ ·1· p·a.

T(n) = 3 yrs

$SI = \frac{PRT}{100} = \frac{P \times 20 \times 3}{100}$

$SI = \frac{P}{5}$

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

$$CI = P\left[\left(1+\frac{20}{300}\right)^3 - 1\right]$$

$$CI = P\left[\left(\frac{16}{15}\right)^3 - 1\right]$$

$$= P\left[\frac{4096}{3375} - 1\right]$$

$$= P\left[\frac{4096 - 3375}{3375}\right]$$

$$P\left[\frac{721}{3375}\right] = ₹\frac{721P}{3375}$$

$CI - SI = 46$

$$\frac{721P}{3375} - \frac{1P}{5} = 46$$

$$₹\left[\frac{721}{3375} - \frac{1}{5}\right]P = 46$$

$$\frac{₹46P}{3375} = 46$$

$$P = \frac{46 \times 3375}{46}$$

$P = ₹3375$

Q19: $P = ₹2400$

$R = 20p/1₹ p.a. = \frac{20}{100} \times 100\% = 20\% p.a.$

$= \frac{20}{4}\% = 5\% p.quater$

$T = 6 months$

$$A = P\left[1+\frac{R}{100}\right]^n$$

$$A = 24000\left[1+\frac{5}{\cancel{100}\ 20}\right]^n$$

$$24000\left[\frac{21}{20}\right]^2$$

$$\cancel{24000}^{60} \times \frac{21}{\cancel{20}} \times \frac{21}{\cancel{20}}$$

$A = ₹26460$

$CI = A - P$

$246460 - 24000$

$= ₹2460$

WS-4

Q1: R = 8·1· p.a.
Present population (P) = 12500
n = 2 yrs
Population after 2 year (A) = $P\left[\frac{1+R}{100}\right]^n$

$12500\left[\frac{1+82}{25\,100}\right]^2$

$12500\left[\frac{27}{25}\right]^2$

$= \frac{20}{\cancel{12500}} \times \frac{27}{\cancel{25}} \times \frac{27}{\cancel{25}}$

$= 20 \times 729$
$= 14580$

Q2: 3 yrs ago population of town (P) = 50,000
$R_1 = 4·1·$ p.a.
$R_2 = 5·1·$ p.a.
$R_3 = 4·1·$ p.a.

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

$50,000\left(\frac{1+4}{\cancel{100}_{25}}\right)\left(\frac{1+5}{\cancel{100}_{20}}\right)\left(\frac{1+4}{\cancel{100}_{25}}\right)$

$\cancel{50,000}^{4}\left(\frac{26}{25}\right)\left(\frac{21}{\cancel{20}}\right)\left(\frac{26}{25}\right)$

$4 \times 26 \times 26 \times 21$
$= 56784$

Q3: Present value of house (P) = ₹13125000
$R = 10·1·$ p.a.
$n = 3$ yrs

Value of house after 3 years (A) = $P\left[1-\frac{R}{100}\right]^n$

$= 13125000\left[\frac{1-10}{100}\right]^3$

$= 13125000\left[\frac{9}{10}\right]^3$

$= 13125\cancel{000} \times \frac{9}{\cancel{10}} \times \frac{9}{\cancel{10}} \times \frac{9}{\cancel{10}}$

= ₹ 9568125

Q4: P = 72000
$R_1 = 7·1·$ p.a.
$R_2 = 5·1·$ p.a.

Profit after 2 yrs (A) = $P\left[\frac{1+R_1}{100}\right]\left[\frac{1+R_2}{100}\right]$

$72000\left[\frac{1+7}{100}\right]\left[\frac{1-\cancel{5}1}{20\,\cancel{100}}\right]$

$\cancel{72000}^{36}\left(\frac{107}{\cancel{100}}\right)\left(\frac{19}{\cancel{20}}\right)$

$36 \times 107 \times 19$

$= ₹73188$

Q5: Present population (P) = 64,000

Net growth rate = 10.7% − 3.2%

= 7.5%

$n = 3$ yrs

Population after 3 yrs $= P\left[1+\frac{R}{100}\right]^n$

$= 64000\left[1+\frac{7.5}{100}\right]^3$

$= 64000\left[1+\frac{7.5}{40\,100}\right]^3$

$= 64000 \times \left[\frac{43}{40}\right]^3$

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

$= 79507$

Q6: Production in the beginning = ₹40,000 (P)

$n = 2$ yrs

$A = 48400$

Let rate of growth be R% p.a.

$A = P\left[1+\frac{R}{100}\right]^n$

$\frac{121}{100}\frac{48400}{40,000} = \left(1+\frac{R}{100}\right)^n$

$\left(\frac{11}{10}\right)^2 = \left(1+\frac{R}{100}\right)^2$

$\frac{11}{10} - 1 = \frac{R}{100}$

$\frac{1}{10} = \frac{R}{100}$

$R = 10\%$

Value Based Question

Q1: No. of blood donors in the beggning = (P) = 16000

$R = 5\%$ p.a. half yr

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

= 3 half years

No. of blood donors after $1\frac{1}{2}$ year (A) $= P\left[1+\frac{R}{100}\right]^n$

$16000\left[1+\frac{5}{20\,100}\right]^3$

$16000 \times \left[\frac{21}{20}\right]^3$

$\frac{2}{16000} \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$

18522

Brain Teasers

Q2: $P = ₹50,000$
$R = 8\%$ p.a.
$n = 3$ yrs

a) $n = 2$ yrs

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$50,000\left[1 + \frac{8}{100}\right]^2$$

$$50,000\left[\frac{27}{25}\right]^2$$

$$\frac{\cancel{50,000}^{\,80} \times 27 \times 27}{\cancel{25}\ \cancel{25}}$$

$₹58320$

b) For 3rd year
$P = ₹58320$
$R = 8\%$ p.a.
$T(n) = 1$ yrs

For 1 year CI & SI are same
$SI = \frac{PRT}{100}$

$$\frac{58320 \times 8 \times 1}{100}$$

583.2×8
$= ₹4665.6$

Q3: Total Money $= ₹75,000$

Case I

$P = ₹35000$
$R = 9\%$ p.a.
$n = 2$ yrs

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$A = 35000\left[1 + \frac{9}{100}\right]^2$$

$$\frac{\cancel{35000} \times 109 \times 109}{100\ \ \cancel{100}}$$

$A = ₹41583.5$
$CI = A - P$
$= ₹6583.5$

Case II

$P = ₹35000$
$R = 9.5\%$ p.a.
$n = 2$ yrs

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$A = 35000\left[1 + \frac{\cancel{95}^{\,19}}{\cancel{1000}\ 200}\right]^2$$

$$\frac{\cancel{35000}^{\,7} \times 219 \times 219}{\cancel{200}^{\,4}\ 200}$$

$A = ₹8\,3931.75$

Q4: Amount at the end of second year $= ₹7396$
So for third year -
$P = ₹7396$
$A = ₹7950.70$

$SI = ₹7950.70 - 7396$
$= ₹554.70$
$T = 1$ year

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

$\frac{55470}{100} = \frac{7396 \times R \times 1}{100}$

$R = \frac{55470}{7396} = 7.5\% \text{ p.a.}$

Q5: Money invested (P) = ₹20,0000

Rate -

$R_1 = 5\%$

$R_2 = 8\%$

$R_3 = 12\%$

Amount after 3 years

$= P\left[1+\frac{R_1}{100}\right]\left[1+\frac{R_2}{100}\right]\left[1+\frac{R_3}{100}\right]$

$200000\left[1+\frac{21}{20\,100}\right]\left[1+\frac{28}{25\,100}\right]\left[1+\frac{12}{25\,100}\right]$

$\frac{16}{2,00,000} \times \frac{21}{20} \times \frac{27}{25} \times \frac{28}{25}$

$= 16 \times 21 \times 27 \times 28$

$= ₹254016$

Total profit after 3 years -

$₹254016 - 200000$

$= ₹54016$

Q6: Let Sum be P and rate of interest be R% p.a.

$T(n) = 2\text{yrs}$

$SI = ₹400$ (case I)

$\frac{PRT}{100} = \frac{P \times R \times 2^1}{100\ 50} = 400$

$P \times R = 400 \times 50 = 20,000 \quad -(1)$

$CI = ₹410$ (case II)

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

$P\left[1^2 + \frac{R^2}{10,000} + 2 \times \frac{R}{100} - 1\right] = 410 \qquad P\left[1 + \frac{R^2}{10,000} + 2 \times \frac{R}{100} - 1\right] = 410$

$P\left[\frac{R^2}{10,000} + \frac{2R}{100}\right] = 410 \qquad \frac{P \times R}{100}\left[\frac{R}{100} + \frac{2}{1}\right] = 410$

$\frac{PR}{100}\left[\frac{R+200}{100}\right] = 410$

Using (1)

$\frac{20,000}{100}\left[\frac{R+200}{100}\right] = 410 \qquad 2(R+200) = 410$

$R + 200 = \frac{410}{2} = 205$

$R = 205 - 200$

$R = 5\%$ p.a.

Using (1)

$PR = 20,000$

$P \times 5 = 20{,}000$

$P = \frac{20{,}000}{5} = 4000$

So $P = ₹4000$

Q7:

Case I

$P = ₹1000$

$R = 11\%$ p.a.

$n = 3$ yrs

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

$\frac{1000 \times 11 \times 3}{100}$

$SI = ₹330$

Case II

$SI = ₹330$

$P = ₹1000$

$R = 10\%$ p.a.

$n = 3$ yrs

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

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

$1000\left[\frac{1331}{1000} - 1\right]$

$1000 \times \frac{331}{1000}$

$CI = ₹331$

So $CI > SI$

$331 > 330$

Q8: Principal (P) = ₹4,00,000

$R = 16\%$ p.a. $= \frac{16}{2}\%$ p.a. (half year) $= 8\%$

$n = 1$ year $= 2$ half years

Amount = ?

$A = P\left[1+\frac{R}{100}\right]^n = 4{,}00{,}000\left[1+\frac{8}{100}\right]^2$

$4{,}00{,}000 \times \frac{27}{25} \times \frac{27}{25}$ (640)

$640 \times 27 \times 27$

$= ₹4{,}66{,}560$

Q10: Annual Growth rate (R) = 8%

Present population = 196830

Time (n) = 3 yrs

$A = P\left[1+\frac{R}{100}\right]^n$

$196830 = P\left[1+\frac{8}{100}\right]^3$

$196830 = P\left[\frac{27}{25}\right]^3$

$196830 \times \frac{25}{27} \times \frac{25}{27} \times \frac{25}{27} = P$ (10)

$P = 156250$

HOTS

1. Let req. sum be ₹x

For 1st year

P = ₹x

R = 10% p.a.

T = 1 yrs

$SI = \frac{PRT}{100} = \frac{x \times 10 \times 1}{100}$

$SI = \frac{₹x}{10}$

A = SI + P

$x + \frac{x}{10}$

$= ₹\frac{11x}{10}$

For second year

$P = ₹\frac{11x}{10}$

R = 10% p.a.

T = 1 yr

$SI = \frac{11x \times 10 \times 1}{100}$

$= ₹\frac{11x}{100}$

$A = P + SI$

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

$\frac{110x + 11x}{100} = ₹\frac{121x}{100}$

For 3rd year

$P = ₹\frac{121x}{100}$

R = 10% p.a.

T = 1 yr

$SI = \frac{121x \times 10 \times 1}{100 \times 100}$

$SI = ₹\frac{121x}{1000}$

ATQ

SI of 3rd yr − SI of 1st year = 1105

$\frac{121x}{1000} - \frac{11x}{10} = 1105$

$\frac{121x - 100x}{1000} = 1105$

$\frac{21x}{1000} = 1105$

$x = \frac{1105 \times 1000}{21}$

$x = ₹52619.04$

Enrichment Ques -

1. No. of workers = 4000

$R_1 = 10\%$

$R_2 = 5\%$

$R_3 = 15\%$

No. of workers during 4th yr -

$$A = P\left[1 - \frac{R_1}{100}\right]\left[1 - \frac{R_2}{100}\right]\left[1 + \frac{R_3}{100}\right]$$

$$A = 4000\left[1 - \frac{10}{100}\right]\left[1 - \frac{5}{100}\right]\left[1 + \frac{15}{100}\right]$$

$$4000\left(\frac{9}{10}\right)\left(\frac{19}{20}\right)\left(\frac{23}{20}\right)$$

$A = 3933$

HW Parts

WS-1

Q3:- Principal (P) = ₹8000

$R = 5\%$ p.a.

$T(n) = 3$ yrs

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$8000\left[1 + \frac{5}{100}\right]^3$$

$$= 8000\left[1 + \frac{1}{20}\right]^3$$

$$= 8000\left(\frac{21}{20}\right)^3 = 8000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

$A = ₹9261$

$CI = A - P$

$= 9261 - 8000$

$= ₹1261$

Q5:- Principal (P) = ₹4096

$n = 3$ yrs

$R = \frac{25}{4}\%$ p.a.

$$A = P\left[1 + \frac{R}{100}\right]^n$$

$$A = 4096\left[1 + \frac{25}{400}\right]^3$$

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

$A = ₹4913$

$CI = A - P$

$₹4913 - 4096$

$= ₹817$

WS-2

Q 5: P = ₹25000

R = 20% p.a.

= 10% p.a. (half year)

(n) = 3 half yrs

$A = P\left[1 + \frac{R}{100}\right]^n$

$A = 25000\left[1 + \frac{10}{100}\right]^3$

$25000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

= ₹33275

WS-3

Q2: P = ₹11200

$R\% = 11\frac{1}{2}\% = \frac{23}{2}\%$ p.a.

Time(n) = 2 yrs

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

$11200\left[\left(1 + \frac{23}{200}\right)^2 - 1\right]$

$11200\left[\left(\frac{47}{40}\right)^2 - 1\right]$

$11200\left[\frac{2209 - 1600}{1600}\right]$

$7\ 11200 \times 609 \ 1600$

= ₹4263

Q3: P = ₹30,000

T(n) = 3 yrs

R% = 6% p.a.

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

$30,000\left[\left(1 + \frac{6}{100}\right)^3 - 1\right]$

$30,000\left[\left(\frac{53}{50}\right)^3 - 1\right]$

$30,000\left[\frac{148877}{125000} - 1\right]$

$30,000\left[\frac{148877 - 125000}{125000}\right]$

$6\ 30,000 \times 23877 \ 125000 \ 25$

$\frac{6 \times 23877}{25}$

= ₹ 5730.48

Q7: SI = ₹6600

Time (n) = 2 yrs

R.I. = $\frac{11}{2}$ % p.a.

Let sum be ₹P

SI = 6600

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

$\frac{6600 = P \times 11 \times 2}{100 \times 2}$

$P \frac{6600^{600} \times 100}{11}$ P

Sum = ₹60,000

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

Q12: P = ₹8000

A = ₹9261

R.I. = 5% p.a.

n = ?

$A = P\left[1+\frac{R}{100}\right]^{n}$

$9261 = 8000\left[1+\frac{5\%}{20/100}\right]^{n}$

$\frac{9261}{8000} = \left[\frac{21}{20}\right]^{n}$

$\left[\frac{21}{20}\right]^{3} = \left[\frac{21}{20}\right]^{n}$

n = 3 years

Q15: Let P be ₹P

R = 15% p.a.

T = 3 yrs

Sum = 283.50

$SI = \frac{P \times R \times T}{100}$

$SI = \frac{P \times 15^{3} \times 3}{100\,20} = ₹\frac{9P}{20}$

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

$CI = P\left[\left(1+\frac{15^{3}}{20\,100}\right)^{3}-1\right]$

$P\left[\frac{12167}{8000}-1\right]$

$P\left[\frac{12167-8000}{8000}\right] = ₹\frac{4167P}{8000}$

CI - SI = 283.50

$\frac{₹4167}{8000}P - \frac{₹9P}{200} = 283.50$

$₹\left[\frac{4167-3600}{8000}\right]P = 283.50$

$\frac{₹567}{8000}P = 283.50$

$P = \frac{28350 \times 8000}{100 \times 567}$

$P = ₹4000$

Q16: $P = ₹12800$

$n = 1$ year

$R = 7\frac{1}{2}\% = \frac{15}{2} \times \frac{1}{2} = \frac{15}{4}\%$ p.a.

$A = P\left[1+\frac{R}{100}\right]^n$

$A = 12800\left[1+\frac{183}{80400}\right]^2$

$A = 12800 \times \frac{83}{80} \times \frac{83}{80}$

$A = ₹13778$

$CI = A - P$

$13778 - 12800$

$= ₹978$

Q17: $P = ₹40960$

$R = \frac{25}{2}\% = \frac{25}{4}\%$ p. half year

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

$A = P\left[1+\frac{R}{100}\right]^n$

$40960\left[1+\frac{251}{400}\right]^3$

$40960 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$

$A = ₹49130$

Q18: $P = 20000$

$R = 20\% \div 4 = 5\%$ p.a.

$T = 9$ months $= 3$ months

$A = P\left[1+\frac{R}{100}\right]^n$

$A = 20,000\left[1+\frac{51}{20100}\right]^3$

$20,000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$

$= \frac{46305}{2}$

$= ₹23152.5$

Value Based Quts

Q2: Population of Town = 2,50,000

R = 4% p.a.

n = 3 yrs

$$P\left[1+\frac{R}{100}\right]^n$$

$$2,50,000\left[1+\frac{4}{100}\right]^3$$

$$25$$

$$2,50,000 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= 281216$$

b) It would result in rapid use of resources, poverty, unemployement.

Brain Teasers

Q:1(B)(a) P = ₹1000

R = 10% p.a.

T(n) = 2yrs

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

$$CI = 1000\left[\left(1+\frac{10}{100}\right)^2 - 1\right]$$

$$1000\left[\left(\frac{11}{10}\right)^2 - 1\right]$$

$$1000\left[\frac{121}{100} - 1\right]$$

$$1000\left[\frac{121-100}{100}\right]$$

$$1000 \times \frac{21}{100}$$

$$= ₹210$$

b) Time (n) = 2 yrs

= 8 quaters

Principal = ₹6000

$$R = \frac{4}{4}\% = 1\% \text{ per quater}$$

c) A = ₹364500

P = ₹5,00,000

R = 10% p.a.

$$A = P\left[1-\frac{R}{100}\right]^n$$

$$\frac{364500}{500000} = \left[1-\frac{10}{100}\right]^n$$

$$\frac{729}{1000}$$

$$\left[\frac{9}{10}\right]^3 = \left[\frac{9}{10}\right]^n$$

$\therefore n = 3$ yrs

d) $P = ₹5000$

$R = 5 \cdot 1 \cdot p.a.$

$T(n) = 2$ yrs

$SI = \frac{PRT}{100} = \frac{5000 \times 5 \times 21}{100\ 50\ 10}$

$SI = ₹500$

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

$5000\left[\left(1+\frac{5\cancel{1}}{\cancel{100}\ 20}\right)^2 - 1\right]$

$5000\left[\left(\frac{21}{20}\right)^2 - 1\right]$

$5000\left[\frac{441 - 400}{400}\right]$

$\overset{25}{\cancel{5000}} \times \frac{41}{\cancel{400}_{2}}$

$\frac{1025}{2} = ₹512.50$

$CI - SI$

$512.50 - 500$

$= ₹12.50$

e) $P = ₹20,000$

$R = 5 \cdot 1 \cdot p.a.$

SI in 1st year

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

$= \frac{20,\cancel{000} \times 5 \times 1}{\cancel{100}}$

$= ₹1000$

Principal for second year :-

$P + SI = A$

$= 20,000 + 1000$

$= ₹21000$

Q9:- Case of Sirish

$P = ₹163840$

$R = 12 \cdot 5 \cdot 1 \cdot p.a.$

$T(n) = 2$yrs

Amount = (A)

$A = P\left[1+\frac{R}{100}\right]^n$

$163840\left[1+\frac{\cancel{125}\ 1}{\cancel{1000}\ 8}\right]^2$

$\overset{\cancel{20480}\ 2560}{\cancel{163840}} \times \frac{9}{\cancel{8}} \times \frac{9}{8}$

$= ₹207360$

Case of Sahej

$P = ₹163840$

$R = 12 \cdot 5 \cdot 1 \cdot p.a. = 12 \cdot 5 \div 2 = \frac{125}{20}\%$

$T(n) = 2$ yrs

4 half years

Amount = (a)

$a = P\left[1+\frac{R}{100}\right]^n$

$163840\left[1+\frac{\overset{1}{\cancel{25}}}{\cancel{400}\ 16}\right]^4$

$\overset{\cancel{40}\ \cancel{10}\ 5}{\cancel{163840}} \times \frac{17}{\cancel{16}} \times \frac{17}{\cancel{16}} \times \frac{17}{\cancel{16}} \times \frac{17}{\cancel{16}}$

$= ₹\frac{417605}{2}$

$= ₹ 208802.50$

Profit $= a - A$

$= 208802.50 - 207360$

$= ₹ 1442.50$