Chapter : 11. COMPOUND INTEREST

Exercise : 11A

Question: 1

Find the amount a

Solution:

Present value = Rs.2500

Interest rate = 10% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$

[Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 2500 (1 + 10/100)^2$

$\Rightarrow A = 2500 (11/10)^2$

$\Rightarrow A = 2500 \times 121/100$

$\Rightarrow A = 25 \times 121$

$\Rightarrow A = 3025$

$\therefore$ Amount = Rs.3025

$\therefore$ Compound interest = Rs.(3025 – 2500)

= Rs.525

Question: 2

Find the amount a

Solution:

Present value = Rs.15625

Interest rate = 12% per annum

Time = 3 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 15625 (1 + 12/100)^3$

$\Rightarrow A = 15625 (112/100)^3$

$\Rightarrow A = 15625 (28/25)^3$

$\Rightarrow A = 15625 \times 21952/15625$

$\Rightarrow A = 21952$

$\therefore$ Amount = Rs.21952

$\therefore$ Compound interest = Rs.(21952 – 15625)

= Rs.6327

Question: 3

Find the differen

Solution:

Present value = Rs.5000

Interest rate = 9% per annum

Time = 2 years

Simple interest (SI) = PRT/100 [where, P = Present value

R = Interest rate, T = Time]

∴ SI = (5000 × 9 × 2)/100

⇒ SI = 50 × 9 × 2

⇒ SI = 900

Now,

Compound interest (CI),

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = $5000 (1 + 9/100)^2$

⇒ A = $5000 (109/100)^2$

⇒ A = $5000 (1.09)^2$

⇒ A = 5000 × 1.1881

⇒ A = 5940.5

∴ Amount = Rs.5940.5

∴ Compound interest = Rs.(5940.5 – 5000)

= Rs.940.5

Now,

Difference between the simple interest and the compound interest = (CI – SI)

= (940.5 – 900)

= 40.5

Question: 4

Ratna obtained a

Solution:

Present value = Rs.25000

Interest rate = 8% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = $25000 (1 + 8/100)^2$

⇒ A = 25000 $(108/100)^2$

⇒ A = 25000 $(1.08)^2$

⇒ A = 25000 × 1.1664

⇒ A = 29160

∴ Amount = Rs.29160

Question: 5

Harpreet borrowed

Solution:

Present value = Rs.20000

Interest rate = 12% per annum

Time = 2 years

Simple interest (SI) = PRT/100 [where, P = Present value

R = Interest rate, T = Time]

∴ SI = (20000 × 12 × 2)/100

⇒ SI = 200 × 12 × 2

⇒ SI = 4800

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 20000 $(1 + 12/100)^2$

⇒ A = 20000 $(112/100)^2$

⇒ A = 20000 $(1.12)^2$

⇒ A = 20000 × 1.2544

⇒ A = 25088

∴ Amount = Rs.25088

∴ Compound interest = Rs.(25088 – 20000)

= Rs.5088

Now,

(CI – SI) = 5088 -4800

= Rs.288

∴ The amount of money Harpreet will gain after two years = Rs.288

Question: 6

Manoj deposited a

Solution:

Present value = Rs.64000

Interest rate = (15/2) % per annum

Time = 3 years

Amount (A) = P (1 + R/100)^n [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 64000 [1 + (15/2 × 1/100)]^3

⇒ A = 64000 [1 + 3/40]^3

⇒ A = 64000 (43/40)^3

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

⇒ A = 1 × 43 × 43 × 43

⇒ A = 79507

∴ Manoj will get an amount of Rs.79507 after 3 years.

Question: 7

Divakaran deposit

Solution:

Present value = Rs.6250

Interest rate = 8 % per annum

Time = 1 years

∵ Interest is compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 6250 [1 + (8/2)/100]^2

⇒ A = 6250 [1 + 4/100]^2

⇒ A = 6250 [26/25]^2

⇒ A = 6250 × 26/25 × 26/25

⇒ A = 10 × 26 × 26

⇒ A = 6760

∴ Amount = Rs.6760

∴ Compound interest = Rs.(6760 – 6250)

= Rs.510

∴ Divakaran gets a CI of Rs.510.

Question: 8

Michael borrowed

Solution:

Present value = Rs.16000

Interest rate = 10% per annum

Time = (3/2) years

∵ Interest is compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 16000 [1 + (10/2)/100]^3$

$\Rightarrow A = 16000 [1 + 5/100]^3$

$\Rightarrow A = 16000 [1 + 1/20]^3$

$\Rightarrow A = 16000 [21/20]^3$

$\Rightarrow A = 16000 \times 21/20 \times 21/20 \times 21/20$

$\Rightarrow A = 2 \times 21 \times 21 \times 21$

$\Rightarrow A = 18522$

$\therefore$ Amount = Rs.18522

Exercise : 11B

Question: 1

Rs. 6000 for 2 ye

Solution:

Present value = Rs.6000

Interest rate = 9% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 6000 (1 + 9/100)^2$

$\Rightarrow A = 6000 (109/100)^2$

$\Rightarrow A = 6000 \times 109/100 \times 109/100$

$\Rightarrow A = 6 \times 109 \times 109/10$

$\Rightarrow A = 7128.6$

$\therefore$ Amount = Rs.7128.6

$\therefore$ Compound interest = Rs.(7128.6 – 6000)

= Rs.1128.6

Question: 2

Rs. 10000 for 2 y

Solution:

Present value = Rs.10000

Interest rate = 11% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 10000 (1 + 11/100)^2$

⇒ A = 10000 $(111/100)^2$

⇒ A = 10000 × 111/100 × 111/100

⇒ A = 1 × 111 × 111

⇒ A = 12321

∴ Amount = Rs.12321

∴ Compound interest = Rs.(12321 – 10000)

= Rs.2321

Question: 3

Rs. 31250 for 3 y

Solution:

Present value = Rs.31250

Interest rate = 8% per annum

Time = 3 years

Amount (A) = P $(1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 31250 $(1 + 8/100)^3$

⇒ A = 31250 $(1 + 2/25)^3$

⇒ A = 31250 $(27/25)^3$

⇒ A = 31250 × 27/25 × 27/25 × 27/25

⇒ A = 31250 × 19683/15625

⇒ A = 2 × 19683

⇒ A = 39366

∴ Amount = Rs.39366

∴ Compound interest = Rs.(39366 – 31250)

= Rs.8116

Question: 4

Rs. 10240 for 3 y

Solution:

Present value = Rs.10240

Interest rate = (25/2) % per annum

Time = 3 years

Amount (A) = P $(1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 10240 $[1 + (25/2)/100]^3$

⇒ A = 10240 $[1 + 1/8]^3$

⇒ A = 10240 $[9/8]^3$

⇒ A = 10240 × 9/8 × 9/8 × 9/8

⇒ A = 10240 × 729/512

⇒ A = 20 × 729

⇒ A = 14580

∴ Amount = Rs.14580

∴ Compound interest = Rs.(14580 – 10240)

= Rs.4340

Question: 5

Rs. 62500 for 2 y

Solution:

Present value = Rs.62500

Interest rate = 12 % per annum

Time = 2 years 6 month = (2 + 1/2) years = (5/2) years

Amount (A) = P $(1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 62500 $(1 + 12/100)^2$ × [1 + (1/2 × 12)/100]

⇒ A = 62500 $(1 + 3/25)^2$ × [1 + 6/100]

⇒ A = 62500 $(28/25)^2$ × [106/100]

⇒ A = 62500 × 28/25 × 28/25 × 106/100

⇒ A = 625 × 784/625 × 106

⇒ A = 1 × 784 × 106

⇒ A = 83104

∴ Amount = Rs.83104

∴ Compound interest = Rs.(83104 – 62500)

= Rs.20604

Question: 6

Rs. 9000 for 2 ye

Solution:

Present value = Rs.9000

Interest rate = 10 % per annum

Time = 2 years 4 month = (2 + 1/3) years = (7/2) years

Amount (A) = P $(1 + R/100)^n$ × [1 + (1/3 × R)/100]

[Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 9000 $(1 + 10/100)^2$ × [1 + (1/3 × 10)/100]

⇒ A = 9000 $(1 + 1/10)^2$ × [1 + 1/30]

⇒ A = 9000 $(11/10)^2$ × [31/30]

⇒ A = 9000 × 121/100 × 31/30

⇒ A = 9 × 121 × 31/3

⇒ A = 3 × 121 × 31

⇒ A = 11253

∴ Amount = Rs.11253

∴ Compound interest = Rs.(11253 – 9000)

= Rs.2253

Question: 7

Find the amount o

Solution:

Present value = Rs.8000

Interest rate for 1^{st} year, p = 9 % per annum

Interest rate for 2^{nd} year, q = 10 % per annum

Time = 2 years

Amount (A) = P × (1 + p/100) × (1 + q/100)

A = 8000 × (1 + 9/100) × (1 + 10/100)

= 8000 × (109/100) × (1 + 1/10)

= 8000 × 109/100 × 11/10

= 8 × 109 × 11

= 9592

∴ Amount = Rs.9592

Question: 8

Anand obtained a

Solution:

Present value = Rs.125000

Interest rate = 8% per annum

Time = 3 years

Amount (A) = P $(1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 125000 $(1 + 8/100)^3$

⇒ A = 125000 $(108/100)^3$

⇒ A = 125000 × 108/100 × 108/100 × 108/100

⇒ A = 125000 × 1259712/1000000

⇒ A = 125 × 1259712/1000

⇒ A = 1259712/8

⇒ A = 157464

∴ Amount = Rs.157464

∴ Anand has to pay Rs.157464 after 3 years to clear the debt.

Question: 9

Three years ago,

Solution:

Present value = Rs.11000

Interest rate = 10% per annum

Time = 3 years

Amount (A) = P $(1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 11000 $(1 + 10/100)^3$

⇒ A = 11000 $(1 + 1/10)^3$

⇒ A = 11000 $(11/10)^3$

⇒ A = 11000 × 11/10 × 11/10 × 11/10

⇒ A = 11000 × 1331/1000

⇒ A = 11 × 1331

⇒ A = 14641

∴ Amount = Rs.14641

∴ Beeru has to pay Rs.14641 to clear the debt.

Question: 10

Shubhalaxmi took

Solution:

Present value = Rs.18000

Interest rate for 1^{st} year, p = 12 % per annum

Interest rate for 2^{nd} year, q = (25/2) % per annum

Time = 2 years

Amount (A) = P × (1 + p/100) × (1 + q/100)

A = 18000 × (1 + 12/100) × [1 + (25/2)/100]

= 18000 × (112/100) × [1 + 25/200]

= 18000 × (112/100) × [1 + 1/8]

= 18000 × 112/100 × 9/8

= 180 × 112 × 9/8

= 180 × 14 × 9

= 22680

∴ Amount = Rs.22680

∴ Shubhlaxmi has to pay Rs.157464 after 2 years.

Question: 11

Neha borrowed Rs.

Solution:

Present value = Rs.24000

Interest rate = 10 % per annum

Time = 2 years 3 month = (2 + 1/4) years = $2\frac{1}{4}$ years.

Amount (A) = P (1 + R/100)^n × [1 + (1/4 × R)/100]

[Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 24000 (1 + 10/100)^2 × [1 + (1/4 × 10)/100]

⇒ A = 24000 (1 + 1/10)^2 × [1 + 1/40]

⇒ A = 24000 (11/10)^2 × [41/40]

⇒ A = 24000 × 121/100 × 41/40

⇒ A = 24 × 121 × 41/4

⇒ A = 6 × 121 × 41

⇒ A = 29766

∴ Amount = Rs.29766

∴ Neha should pay Rs. 29766 to the bank after 2 years 3 months.

Question: 12

Abhay borrowed Rs

Solution:

Present value = Rs.16000

Interest rate = $7\frac{1}{2}$% = (15/2) % per annum

Time = 2 years

Simple interest (SI) = PRT/100 [where, P = Present value

R = Interest rate, T = Time]

∴ SI = (16000 × (15/2) × 2)/100

⇒ SI = 160 × 15

⇒ SI = 2400

Now,

Amount (A) = P (1 + R/100)^n [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 16000 [1 + (15/2)/100]^2

⇒ A = 16000 [1 + 3/40]^2

⇒ A = 16000 [43/40]^2

⇒ A = 16000 × 1849/1600

⇒ A = 10 × 1849

⇒ A = 18490

∴ Amount = Rs.18490

∴ Compound interest = Rs.(18490 – 16000)

= Rs.2490

Now,

(CI – SI) = 2490 -2400

= Rs.90

∴ Abhay gains Rs.90 at the end of 2 years.

Question: 13

The simple intere

Solution:

Simple interest = Rs.2400

Interest rate = 8% per annum

Time = 2 years

Simple interest (SI) = PRT/100 [where, P = Present value

R = Interest rate

∴ 2400 = (P × 8 × 2)/100 T = Time]

⇒ 2400 = P × 16/100

⇒ 2400 = P × 4/25

⇒ P = 2400 × 25/4

⇒ P = 600 × 25

⇒ P = 15000

∴ Sum = Rs.15000

Now,

Amount (A) = P (1 + R/100)^{n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 15000 [1 + 8/100]^{2}

⇒ A = 15000 [1 + 2/25]^{2}

⇒ A = 15000 [27/25]^{2}

⇒ A = 15000 × 27/25 × 27/25

⇒ A = 600 × 27 × 27/25

⇒ A = 24 × 27 × 27

⇒ A = 17496

∴ Amount = Rs.17496

∴ Compound interest = Rs.(17496 – 15000)

= Rs.2496

Question: 14

The difference be

Solution:

Let sum = P

Interest rate = 6% per annum

Time = 2 years

Simple interest (SI) = PRT/100 [Where, P = Present value

R = Annual interest rate

T = Time in years]

∴ SI = (P × 6 × 2)/100

⇒ SI = 3P/25 _____ (i)

Compound interest (CI) = $P (1 + R/100)^n$ - P [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ CI = $P (1 + 6/100)^2$ - P

⇒ CI = $P (1 + 3/50)^2$ - P

⇒ CI = $P (53/50)^2$ - P

⇒ CI = (2809P/2500)- P

⇒ CI = (2809P – 2500P)/2500

⇒ CI = 309P/2500 _____ (ii)

Now,

CI – SI = (309P/2500) – (3P/25)

⇒ 90 = (309P/2500) – (3P/25) [Given, CI – SI = 90]

⇒ 90 = (309P – 300P)/2500

⇒ 90 = 9P/2500

⇒ P = 90 × 2500/9

⇒ P = 10 × 2500

⇒ P = 25000

∴ Sum = Rs.25000

Question: 15

The difference be

Solution:

Let sum = P

Interest rate = 10% per annum

Time = 3 years

Simple interest (SI) = PRT/100 [Where, P = Present value

R = Annual interest rate

T = Time in years]

∴ SI = (P × 10 × 3)/100

⇒ SI = 3P/10 _____ (i)

Compound interest (CI) = $P (1 + R/100)^n$ - P [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ CI = P (1 + 10/100)^3 - P

⇒ CI = P (1 + 1/10)^3 - P

⇒ CI = P (11/10)^3 - P

⇒ CI = (1331P/1000)- P

⇒ CI = (1331P – 1000P)/1000

⇒ CI = 331P/1000 _____ (ii)

Now,

CI – SI = (331P/1000) – (3P/10)

⇒ 93 = (331P/1000) – (3P/10) [Given, CI – SI = 93]

⇒ 93 = (331P – 300P)/1000

⇒ 93 = 31P/1000

⇒ P = 93 × 1000/31

⇒ P = 3 × 1000

⇒ P = 3000

∴ Sum = Rs.3000

Question: 16

A sum of money am

Solution:

Let sum = P

Interest rate = $6\frac{2}{3}$% = (20/3) % per annum

Time = 2 years

Now,

Amount (A) = P (1 + R/100)^n [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = P[1 + (20/3)/100]^2

⇒ 10240 = P [1 + 1/15]^2

⇒ 10240 = P [16/15]^2

⇒ 10240 = P × 256/225

⇒ P = 10240 × 225/256

⇒ P = 40 × 225

⇒ P = 9000

∴ Sum = Rs.9000

Question: 17

What sum of money

Solution:

Let sum = P

Interest rate = 10% per annum

Time = 3 years

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = P (1 + 10/100)^3$

$\Rightarrow 21296 = P (1 + 1/10)^3$

$\Rightarrow 21296 = P (11/10)^3$

$\Rightarrow 21296 = P \times 1331/1000$

$\Rightarrow P = 21296 \times 1000/1331$

$\Rightarrow P = 16 \times 1000$

$\Rightarrow P = 16000$

$\therefore$ Sum = Rs.16000

Question: 18

At what rate per

Solution:

Let rate = R % per annum

P = Rs.4000

A = Rs.4410

Time = 2 years

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = P (1 + R/100)^2$

$\Rightarrow 4410 = 4000 (1 + R/100)^2$

$\Rightarrow (1 + R/100)^2 = 4410/4000$

$\Rightarrow (1 + R/100)^2 = 441/400$

$\Rightarrow (1 + R/100) = \sqrt{(441/400)}$

$\Rightarrow R/100 = (21/20) - 1$

$\Rightarrow R/100 = (21 – 20)/20$

$\Rightarrow R/100 = 1/20$

$\Rightarrow R = 100/20$

$\Rightarrow R = 5$

$\therefore$ Rate = 5% per annuam.

Question: 19

At what rate per

Solution:

Let rate = R % per annum

P = Rs.640

A = Rs.774.40

Time = 2 years

Now,

Amount (A) = P $(1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = P (1 + R/100)^2$

$\Rightarrow 774.40 = 640 (1 + R/100)^2$

$\Rightarrow (1 + R/100)^2 = 774.40/640$

$\Rightarrow (1 + R/100)^2 = 1.21$

$\Rightarrow (1 + R/100) = \sqrt{(1.21)}$

$\Rightarrow R/100 = (1.1) - 1$

$\Rightarrow R/100 = 0.1$

$\Rightarrow R = 0.1 \times 100$

$\Rightarrow R = 10$

$\therefore$ Rate = 10% per annuam.

Question: 20

In how many years

Solution:

Let time = n years

P = Rs.1800

A = Rs.2178

R = 10% per annum

Now,

Amount (A) = P $(1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = P (1 + R/100)^n$

$\Rightarrow 2178 = 1800 (1 + 10/100)^n$

$\Rightarrow (1 + 1/10)^n = 2178/1800$

$\Rightarrow (11/10)^n = 121/100$

$\Rightarrow (11/10)^n = (11/10)^2$

⇒ n = 2

∴ Time = 2 years.

Question: 21

In how many years

Solution:

Let time = n years

P = Rs.6250

A = Rs.7290

R = 8% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ A = P (1 + R/100)^n

⇒ 7290 = 6250 (1 + 8/100)^n

⇒ (1 + 2/25)^n = 7290/6250

⇒ (27/25)^n = 729/625

⇒ (27/25)^n = (27/25)^2

⇒ n = 2

∴ Time = 2 years.

Question: 22

The population of

Solution:

Population of a town, P = 125000

Time, n = 3 years

Increasing rate, R = 2% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Population = P (1 + R/100)^n

= 125000 (1 + 2/100)^3

= 125000 (1 + 1/50)^3

= 125000 (51/50)^3

= 125000 × 51/50 × 51/50 × 51/50

= 1 × 51 × 51 × 51

= 132651

∴ Population of a town after 3 years is 132651.

Question: 23

Three years ago,

Solution:

Population of a town, P = 50000

Interest rate for 1^{st} year, p = 5%

Interest rate for 2^{nd} year, q = 4%

Interest rate for 3^{rd} year, r = 3%

Time, n = 3 years

Now,

Present population = P × (1 + p/100) × (1 + q/100) × (1 + r/100)

= 50000 × (1 + 5/100) × (1 + 4/100) × (1 + 3/100)

= 50000 × (1 + 1/20) × (1 + 1/25) × (1 + 3/100)

= 50000 × 21/20 × 26/25 × 103/100

= 50 × 21/2 × 26/25 × 103

= 1 × 21 × 26 × 103

= 56238

∴ Present population of a town is 56238.

Question: 24

The population of

Solution:

Population of a city in 2013, P = 120000

Time, n = 3 years

Increasing rate, R = 6% per annum

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴Population of the city in the year 2014,

∴ Population = $P (1 + R/100)^n$

= $120000 (1 + 6/100)^1$

= 120000 (1 + 3/50)

= 120000 (53/50)

= 120000 × 53/50

= 2400 × 53

= 127200

∴ Population of a city in 2014 is 127200.

Now,

Decreasing rate = 8%

∴Population of the city in the year 2015,

∴ Population = $P (1 - R/100)^n$

= $127200 (1 - 5/100)^1$

= 127200 (1 - 1/20)

= 127200 (19/20)

= 127200 × 19/20

= 6360 × 19

= 120840

∴ Population of a city in 2015 is 120840.

Question: 25

The count of bact

Solution:

Count of bacteria, P = 500000

Time, n = 2 hours

Increasing rate, R = 2% per hour

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time]

∴ Count of bacteria = $P (1 + R/100)^n$

= $500000 (1 + 2/100)^2$

= $500000 (102/100)^2$

= 500000 × 102/100 × 102/100

= 50 × 102 × 102

= 520200

∴ Count of bacteria at the end of 2 hours is 520200.

Question: 26

The bacteria in a

Solution:

Initial count of bacteria, P = 20000

Time, n = 3 hours

Increasing rate, R = 10% per hour

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time]

∴Count of bacteria at the end of 1^{st} hour,

∴ Count of bacteria = $P (1 + R/100)^n$

= $20000 (1 + 10/100)^1$

= $20000 (1 + 1/10)$

= $20000 (11/10)$

= $20000 \times 11/10$

= 2000×11

= 22000

∴ Count of bacteria at the end of 1^{st} hour is 22000.

Now,

Decreasing rate = 10%

∴Count of bacteria at the end of 2^{nd} hour,

∴ Count of bacteria = $P (1 + R/100)^n$

= $22000 (1 - 10/100)^1$

= $22000 (1 - 1/10)$

= $22000 \times 9/10$

= 2200×9

= 19800

∴ Count of bacteria at the end of 2^{nd} hours is 19800.

Now,

Increasing rate = 10%

∴Count of bacteria at the end of 3^{rd} hour,

∴ Count of bacteria = $P (1 + R/100)^n$

= $19800 (1 + 10/100)^1$

= $19800 (1 + 1/10)$

= $19800 (11/10)$

= $19800 \times 11/10$

= 1980×11

= 21780

∴ Count of bacteria at the end of 3^{rd} hours is 21780.

Question: 27

A machine is purc

Solution:

Present value of machine, P = Rs.625000

Time, n = 2 years

Rate of depreciates, R = 8% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Value = P (1 - R/100)^n [∵ Rate decreases]

= 625000 (1 - 8/100)^2

= 625000 (1 - 2/25)^2

= 625000 (23/25)^2

= 625000 × 729/625

= 1000 × 529

= 529000

∴ Value of machine after 2 years will be Rs.529000.

Question: 28

A scooter is boug

Solution:

Present value of scooter, P = Rs.56000

Time, n = 3 years

Rate of depreciates, R = 10% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Value = P (1 - R/100)^n [∵ Rate decreases]

= 56000 (1 - 10/100)^3

= 56000 (1 - 1/10)^3

= 56000 (9/10)^3

= 56000 × 729/1000

= 56 × 729

= 40824

∴ Value of scooter after 3 years will be Rs.40824.

Question: 29

A car is purchase

Solution:

Present value of car, P = Rs.348000

Rate of depreciates for 1st year, p = 10%

Rate of depreciates for 2nd year, q = 20%

Time, n = 2 years

Now,

Value = P × (1 - p/100) × (1 - q/100)

= 348000 × (1 - 10/100) × (1 - 20/100)

= 348000 × (1 - 1/10) × (1 - 1/5)

= 348000 × 9/10 × 4/5

= 34800 × 9 × 4/5

= 6960 × 9 × 4

= 25056

∴ Value of the car after 2 years is Rs.25056.

Question: 30

The value of a ma

Solution:

Let the 3 years ago machine value = P

Rate of depreciates, R = 10%

Time, n = 3 years

Now,

Value = $P (1 + R/100)^n$ [Where,

P = Present value

R = Annual interest rate

n = Time in years]

∴ Value = $P (1 - 10/100)^n$ [∵ Rate decreases]

⇒ $291600 = P (1 - 1/10)^3$

⇒ $291600 = P (9/10)^3$

⇒ 291600 = P × 729/1000

⇒ P = 291600 × 1000/729

⇒ P = 400 × 1000

⇒ P = 400000

∴ Initial value of machine is Rs.400000.

Exercise : 11C

Question: 1

Find the amount a

Solution:

Present value, P = Rs.8000

Interest rate, R = 10% per annum

Time, n = 1 years

∵ Compounded half-yearly.

∴ Amount (A) = $P [1 + (R/2)/100]^{2n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 8000 $[1 + (10/2)/100]^2$

⇒ A = 8000 $[1 + 5/100]^2$

⇒ A = 8000 $[1 + 1/20]^2$

⇒ A = 8000 $[21/20]^2$

⇒ A = 8000 × 441/400

⇒ A = 20 × 441

⇒ A = 8820

∴ Amount = Rs.8820

∴ Compound interest = Rs.(8820 – 8000) [∵CI = A – P]

= Rs.820

Question: 2

Find the amount a

Solution:

Present value, P = Rs.31250

Interest rate, R = 8% per annum

Time, n = (3/2) years

∵ Compounded half-yearly.

∴ Amount (A) = P $[1 + (R/2)/100]^{2n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 31250 $[1 + (8/2)/100]^3$ [2n = 2 × 3/2]

⇒ A = 31250 $[1 + 4/100]^3$

⇒ A = 31250 $[1 + 1/25]^3$

⇒ A = 31250 $[26/25]^3$

⇒ A = 31250 × 17576/15625

⇒ A = 2 × 17576

⇒ A = 35152

∴ Amount = Rs.35152

∴ Compound interest = Rs.(35152 – 31250) [∵CI = A – P]

= Rs.3902

Question: 3

Find the amount a

Solution:

Present value, P = Rs.12800

Interest rate, R = (15/2)% per annum

Time, n = 1 years

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 12800 [1 + (15/4)/100]^{2}

⇒ A = 12800 [1 + 3/80]^{2}

⇒ A = 12800 [83/80]^{2}

⇒ A = 12800 × 6889/6400

⇒ A = 128 × 6889/64

⇒ A = 2 × 6889

⇒ A = 13778

∴ Amount = Rs.13778

∴ Compound interest = Rs.(13778 – 12800) [∵CI = A – P]

= Rs.978

Question: 4

Find the amount a

Solution:

Present value, P = Rs.160000

Interest rate, R = 10% per annum

Time, n = 2 years

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 160000 [1 + (10/2)/100]^{4}

⇒ A = 160000 [1 + 5/100]^{4}

⇒ A = 160000 [1 + 1/20]^{4}

⇒ A = 160000 [21/20]^{4}

⇒ A = 160000 × 21/20 × 21/20 × 21/20 × 21/20

⇒ A = 160000 × 194481/160000

⇒ A = 1 × 194481

⇒ A = 194481

∴ Amount = Rs.8820

∴ Compound interest = Rs.(194481 – 160000) [∵CI = A – P]

= Rs.34481

Question: 5

Swati borrowed Rs

Solution:

Present value, P = Rs.40960

Interest rate, R = (25/2)% per annum

Time, n = 3/2 years

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 40960 [1 + (25/4)/100]^{3} [R = 25/2 and n = 3/2 years]

⇒ A = 40960 [1 + 1/16]^{3}

⇒ A = 40960 [17/16]^{3}

⇒ A = 40960 × 4913/4096

⇒ A = 10 × 4913

⇒ A = 49130

∴ Amount = Rs.49130

∴ Compound interest = Rs.(49130 – 40960) [∵CI = A – P]

= Rs.8170

Question: 6

Mohd. Aslam purch

Solution:

Initial value, P = Rs.125000

Interest rate, R = 12% per annum

Time, n = (1 + 1/2) years = 3/2 years

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 125000 [1 + (12/2)/100]^{3} [n = 3/2 years]

⇒ A = 125000 [1 + 6/100]^{3}

⇒ A = 125000 [1 + 3/50]^{3}

⇒ A = 125000 [53/50]^{3}

⇒ A = 125000 × 53/50 × 53/50 × 53/50

⇒ A = 125000 × 148877/125000

⇒ A = 1 × 148877

⇒ A = 148877

∴ Amount = Rs.148877

∴ Compound interest = Rs.(148877 – 125000) [∵CI = A – P]

= Rs.23877

∴ Rs.23877 interest paid by Aslam after (3/2) years.

Question: 7

Sheela deposited

Solution:

Present value, P = Rs.20000

Interest rate, R = 6% per annum

Time, n = 1 years

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 20000 [1 + (6/2)/100]^{2}

⇒ A = 20000 [1 + 3/100]^{2}

⇒ A = 20000 [103/100]^{2}

⇒ A = 20000 × 103/100 × 103/100

⇒ A = 2 × 103 × 103

⇒ A = 21218

∴ Amount = Rs.21218

∴ Shella gets Rs.21218 after 1 year.

Question: 8

Neeraj lent Rs. 6

Solution:

Initial value, P = Rs.65536

Interest rate, R = (25/2)% per annum

Time, n = 2 years

∵ Compounded annually.

∴ Amount (A) = P [1 + R/100]^{n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 65536 [1 +(25/2) /100]^{2}

⇒ A = 65536 [1 + 1/8]^{2}

⇒ A = 65536 [9/8]^{2}

⇒ A = 65536 × 9/8 × 9/8

⇒ A = 65536 × 81/64

⇒ A = 1024 × 81

⇒ A = 82944

∴ Amount = Rs.82944

∴ Compound interest = Rs.(82944 – 65536) [∵CI = A – P]

= Rs.17408

Now,

∵ Compounded half-yearly.

∴ Amount (A) = P [1 + (R/2)/100]^{2n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 65536 [1 + (25/4)/100]^{4} [R = (25/2)% and n = 2 years]

⇒ A = 65536 [1 + 1/16]^{4}

⇒ A = 65536 [17/16]^{4}

⇒ A = 65536 × 17/16 × 17/16 × 17/16 × 17/16

⇒ A = 65536 × 83521/65536

⇒ A = 1 × 83521

⇒ A = 83521

∴ Amount = Rs.83521

∴ Compound interest = Rs.(83521 – 65536) [∵CI = A – P]

= Rs.17985

Now,

Difference between interests compound half-yearly and yearly,

= Rs.(17985 – 17408)

= Rs.577

Question: 9

Sudershan deposit

Solution:

Present value, P = Rs.32000

Interest rate, R = 5% per annum

Time, n = 6 months = (1/2) years

∵ Compounded quarterly,

∴ Amount (A) = P [1 + (R/4)/100]^{4n} [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 362000 [1 + (5/4)/100]^{2} [4n = 4 × 1/2]

⇒ A = 32000 [1 + 1/80]^{2}

⇒ A = 32000 [81/80]^{2}

⇒ A = 32000 × 81/80 × 81/80

⇒ A = 400 × 81 × 81/80

⇒ A = 5 × 81 × 81

⇒ A = 32805

∴ Amount = Rs.32805

∴ Sudershan will receive amount of Rs.32805 after 6 months.

Question: 10

Arun took a loan

Solution:

Present value, P = Rs.390625

Interest rate, R = 16% per annum

Time, n = 1 year

∵ Compounded quarterly,

∴ Amount (A) = $P [1 + (R/4)/100]^{4n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 390625 [1 + (16/4)/100]^4$

⇒ $A = 390625 [1 + 4/100]^4$

⇒ $A = 390625 [1 + 1/25]^4$

⇒ $A = 390625 [26/25]^4$

⇒ A = 390625 × 26/25 × 26/25 × 26/25 × 26/25

⇒ A = 390625 × 456976/390625

⇒ A = 1 × 456976

⇒ A = 456976

∴ Amount = Rs.456976

∴ Arun has to pay Rs.45976 after 1 year.

Exercise : CCE TEST PAPER-11

Question: 1

Find the amount a

Solution:

Present value = Rs.3000

Interest rate = 10% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 3000 (1 + 10/100)^2$

⇒ $A = 3000 (1 + 1/10)^2$

⇒ $A = 3000 (11/10)^2$

⇒ A = 3000 × 11/10 × 11/10

⇒ A = 3000 × 121/100

⇒ A = 30 × 121

⇒ A = 3630

∴ Amount = Rs.3630

∴ Compound interest = Rs.(3630 – 3000)

= Rs.630

Question: 2

Find the amount o

Solution:

Present value = Rs.10000

Interest rate for 1^{st} year, p = 10 % per annum

Interest rate for 2^{nd} year, q = 12 % per annum

Time = 2 years

Amount (A) = P × (1 + p/100) × (1 + q/100)

A = 10000 × (1 + 10/100) × (1 + 12/100)

= 10000 × (1 + 1/10) × (112/100)

= 10000 × 11/10 × 112/100

= 10 × 11 × 112

= 12320

∴ Amount = Rs.12320

∴ Compound interest = Rs.(12320 – 10000)

= Rs.2320

Question: 3

Find the amount a

Solution:

Present value = Rs.6000

Interest rate = 10 % per annum

Time = 1 years

∵ Interest is compounded half-yearly.

∴ Amount (A) = P $[1 + (R/2)/100]^{2n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 6000 $[1 + (10/2)/100]^2$

⇒ A = 6000 $[1 + 5/100]^2$

⇒ A = 6000 $[1 + 1/20]^2$

⇒ A = 6000 $[21/20]^2$

⇒ A = 6000 × 21/20 × 21/20

⇒ A = 300 × 21 × 21/20

⇒ A = 15 × 21 × 21

⇒ A = 6615

∴ Amount = Rs.6615

∴ Compound interest = Rs.(6615 – 6000)

= Rs.615

Question: 4

A sum amounts to

Solution:

Let sum = P

Amount (A) = Rs.23762

Interest rate = 9 % per annum

Time = 2 years

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = P(1 + 9/100)^{2\ 2}$

$\Rightarrow 23762 = P (109/100)^2$

$\Rightarrow 23762 = P \times 11881/10000$

$\Rightarrow P = 23762 \times 10000/11881$

$\Rightarrow P = 2 \times 10000$

$\Rightarrow P = 20000$

$\therefore$ Sum = Rs.20000

Question: 5

A scooter is boug

Solution:

Present value, P = Rs.32000

Time, n = 2 years

Rate of depreciates, R = 10% per annum

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

$\therefore$ Value = $P (1 - R/100)^n$ [$\because$ Rate decreases]

$= 32000 (1 - 10/100)^2$

$= 32000 (1 - 1/10)^2$

$= 32000 (9/10)^2$

$= 32000 \times 9/10 \times 9/10$

$= 320 \times 9 \times 9$

= 25920

$\therefore$ Value of scooter will be Rs.25920 after 2 years.

Question: 6

The compound inte

Solution:

Present value = Rs.5000

Interest rate = 10% per annum

Time = 2 years

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 5000 (1 + 10/100)^2$

$\Rightarrow A = 5000 (1 + 1/10)^2$

$\Rightarrow A = 5000 (11/10)^2$

$\Rightarrow A = 5000 \times 11/10 \times 11/10$

$\Rightarrow A = 5000 \times 121/100$

$\Rightarrow A = 50 \times 121$

$\Rightarrow A = 6050$

$\therefore$ Amount = Rs.6050

$\therefore$ Compound interest = Rs.(6050 – 5000)

= Rs.1050

Question: 7

The annual rate o

Solution:

Population of a town, P = 4000

Time, n = 2 years

Increasing rate, R = 5% per annum

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

$\therefore$ Population = $P (1 + R/100)^n$

$= 4000 (1 + 5/100)^2$

$= 4000 (1 + 1/20)^2$

$= 4000 (21/20)^2$

$= 4000 \times 21/20 \times 21/20$

$= 200 \times 21 \times 21/20$

$= 10 \times 21 \times 21$

= 4410

∴ Population of a town after 2 years is 4410.

Question: 8

At what rate per

Solution:

Present value, P = Rs.5000

Amount, A = Rs.5832

Time, n = 2 years

Now,

Amount (A) = P $(1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Amount (A) = P $(1 + R/100)^n$

⇒ 5832 = 5000 $(1 + R/100)^2$

⇒ $(1 + R/100)^2$ = 5832/5000

⇒ $(1 + R/100)^2$ = 2916/2500

⇒ $(1 + R/100)^2$ = $(54/50)^2$

⇒ 1 + R/100 = 54/50

⇒ R/100 = (54/50) - 1

⇒ R/100 = (54 – 50)/50

⇒ R/100 = 4/50

⇒ R = 400/50

⇒ R = 8

∴ Rate = 8 %.

Question: 9

If the simple int

Solution:

Simple interest = Rs.1500

Interest rate = 10% per annum

Time = 3 years

Simple interest (SI) = PRT/100 [where, P = Present value

R = Interest rate

∴ 1500 = (P × 10 × 3)/100 T = Time]

⇒ 1500 = P × 30/100

⇒ 1500 = P × 3/10

⇒ P = 1500 × 10/3

⇒ P = 500 × 10

⇒ P = 5000

∴ Sum = Rs.5000

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

$\therefore A = 5000 [1 + 10/100]^3$

$\Rightarrow A = 5000 [1 + 1/10]^3$

$\Rightarrow A = 5000 [11/10]^3$

$\Rightarrow A = 5000 \times 11/10 \times 11/10 \times 11/10$

$\Rightarrow A = 5000 \times 1331/1000$

$\Rightarrow A = 5 \times 1331$

$\Rightarrow A = 6655$

$\therefore$ Amount = Rs.6655

$\therefore$ Compound interest = Rs.(6655 – 5000)

= Rs.1655

Question: 10

If the compound i

Solution:

Compound interest, CI = Rs.1050

Interest rate, R = 10% per annum

Time = 2 years

$\therefore CI = P (1 + R/100)^n - P$

$\Rightarrow 1050 = P (1 + 10/100)^2 - P$

$\Rightarrow 1050 = P (1 + 1/10)^2 - P$

$\Rightarrow 1050 = P (11/10)^2 - P$

$\Rightarrow 1050 = 121P/100 - P$

$\Rightarrow 1050 = (121P - 100P)/100$

$\Rightarrow 1050 = 21P/100$

$\Rightarrow P = 1050 \times 100/21$

$\Rightarrow P = 50 \times 100$

$\Rightarrow P = 5000$

$\therefore$ Sum = Rs.5000

Question: 11

Fill in the blank

Solution:

(i) R

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

(ii) Compound interest

Amount (A) = P (1 + R/100)^n

And Compound interest = P (1 + R/100)^n - P

(iii) Rs. $P\left(1-\frac{R}{100}\right)^2$

∵ Rate decreases.

∴ Value = P (1 - R/100)^n

Present value of machine = Rs.P

Interest rate = R% per annum

Time, n = 2

∴ Value = Rs. $P\left(1-\frac{R}{100}\right)^2$

(iv) $P\left(1+\frac{R}{100}\right)^5$

Present population of a town = P

Increases rate = R% per annum

Time, n = 5 years

∴ Population = P (1 + R/100)^n [Where,

P = Present value

R = Annual interest rate

n = Time in years]

∴ Population after 5 years = $P\left(1+\frac{R}{100}\right)^5$

Exercise : 11D

Question: 1

The compound inte

Solution:

Present value, P = Rs.5000

Interest rate, R = 8% per annum

Time, n = 2 years

∴ Amount (A) = P (1 + R/100)^n [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ A = 5000 (1 + 8/100)^2

⇒ A = 5000 (1 + 2/25)^2

⇒ A = 5000 (27/25)^2

⇒ A = 5000 × 27/25 × 27/25

⇒ A = 200 × 27 × 27/25

⇒ A = 8 × 27 × 27

⇒ A = 5832

∴ Amount = Rs.5832

∴ Compound interest = Rs.(5832 – 5000) [∵CI = A – P]

= Rs.832

Question: 2

The compound inte

Solution:

Present value, P = Rs.10000

Interest rate, R = 8% per annum

Time, n = 3 years

∴ Amount (A) = $P (1 + R/100)^n$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 10000 (1 + 10/100)^3$

⇒ $A = 10000 (1 + 1/10)^3$

⇒ $A = 10000 (11/10)^3$

⇒ A = 10000 × 11/10 × 11/10 × 11/10

⇒ A = 10 × 11 × 11 × 11

⇒ A = 13310

∴ Amount = Rs.13310

∴ Compound interest = Rs.(13310 – 10000) [∵CI = A – P]

= Rs.3310

Question: 3

The compound inte

Solution:

Present value, P = Rs.10000

Interest rate, R = 12% per annum

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

∴ Amount (A) = $P (1 + R/100)^n \times [1 + (R/2)/100]$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 10000 (1 + 12/100)^1 \times [1 + (12/2)/100]$

⇒ A = 10000 (1 + 12/100) × [1 + 6/100]

⇒ A = 10000 (112/100) × [106/100]

⇒ A = 10000 × 112/100 × 106/100

⇒ A = 1 × 112 × 106

⇒ A = 11872

∴ Amount = Rs.11872

∴ Compound interest = Rs.(11872 – 10000) [∵CI = A – P]

= Rs.1872

Question: 4

The compound inte

Solution:

Present value, P = Rs.4000

Interest rate, R = 10% per annum

Time, n =2 years 3 months = (2 + 1/4) years

∴ Amount (A) = $P (1 + R/100)^n \times [1 + (R/4)/100]$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 4000 (1 + 10/100)^2 \times [1 + (10/4)/100]$

⇒ $A = 4000 (1 + 1/10)^2 \times [1 + 1/40]$

⇒ $A = 4000 (11/10)^2 \times [41/40]$

⇒ $A = 4000 \times 121/100 \times 41/40$

⇒ $A = 40 \times 121 \times 41/40$

⇒ $A = 121 \times 41$

⇒ A = 4961

∴ Amount = Rs.4961

∴ Compound interest = Rs.(4961 – 4000) [∵CI = A – P]

= Rs.961

Question: 5

A sum of Rs. 2500

Solution:

Sum, P = 25000

Interest rate for 1^{st} year, p = 5%

Interest rate for 2^{nd} year, q = 6%

Interest rate for 3^{rd} year, r = 8%

Time, n = 3 years

Now,

Amount (A) = $P \times (1 + p/100) \times (1 + q/100) \times (1 + r/100)$

= $25000 \times (1 + 5/100) \times (1 + 6/100) \times (1 + 8/100)$

= $25000 \times (1 + 1/20) \times (1 + 3/50) \times (1 + 2/25)$

= $25000 \times 21/20 \times 53/50 \times 27/25$

= $250 \times 21/2 \times 53/5 \times 27/25$

= $10 \times 21/2 \times 53/5 \times 27$

= 1 × 21 × 53 × 27

= 30051

∴ Compound interest = Rs.(30051 – 25000) [∵CI = A – P]

= Rs.50051

Question: 6

The compound inte

Solution:

Initial value, P = Rs.6250

Interest rate, R = 8% per annum

Time, n = 1 years

∵ Compounded half-yearly.

∴ Amount (A) = $P [1 + (R/2)/100]^{2n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 6250 [1 +(8/2) /100]^2$

⇒ $A = 6250 [1 + 4/100]^2$

⇒ $A = 6250 [1 + 1/25]^2$

⇒ $A = 6250 [26/25]^2$

⇒ A = 6250 × 26/25 × 26/25

⇒ A = 6250 × 26/25 × 26/25

⇒ A = 250 × 26 × 26/25

⇒ A = 10 × 26 × 26

⇒ A = 6760

∴ Amount = Rs.6760

∴ Compound interest = Rs.(6760 – 6250) [∵CI = A – P]

= Rs.510

Question: 7

The compound inte

Solution:

Present value, P = Rs.40000

Interest rate, R = 6% per annum

Time, n =6 months = 1/2 years

∵ Compounded quarterly.

∴ Amount (A) = $P [1 + (R/4)/100]^{4n}$ [Where, P = Present value

R = Annual interest rate

n = Time in years]

∴ $A = 40000 [1 +(6/4) /100]^2$ [4n = 4 × 1/2]

⇒ $A = 40000 [1 + 3/200]^2$

⇒ A = 40000 $[1 + 3/200]^2$

⇒ A = 40000 $[203/200]^2$

⇒ A = 40000 × 203/200 × 203/200

⇒ A = 40000 × 203/200 × 203/200

⇒ A = 200 × 203 × 203/200

⇒ A = 1 × 203 × 203

⇒ A = 41209

∴ Amount = Rs.41209

∴ Compound interest = Rs.(41209 – 40000) [∵CI = A – P]

= Rs.1209

Question: 8

The present popul

Solution:

Population of a town, P = 24000

Time, n = 2 years

Increasing rate, R = 5% per annum

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Population = $P (1 + R/100)^n$

= $24000 (1 + 5/100)^2$

= $24000 (1 + 1/20)^2$

= $24000 (21/20)^2$

= 24000 × 21/20 × 21/20

= 240 × 21/2 × 21/2

= 60 × 21 × 21

= 26460

∴ Population of a town is 26460 after 2 years.

Question: 9

The value of a ma

Solution:

Value of a machine 3 years ago, P = Rs.60000

Time, n = 3 years

Rate of depreciates, R = 10% per annum

Now,

Amount (A) = $P (1 + R/100)^n$ [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Value = P (1 - R/100)^n [∵ Rate decreases]

= 60000 (1 - 10/100)^3

= 60000 (1 - 1/10)^3

= 60000 (9/10)^3

= 60000 × 9/10 × 9/10 × 9/10

= 60 × 9 × 9 × 9

= 43740

∴ Present value of the machine is Rs.43740.

Question: 10

The value of a ma

Solution:

Let value of a machine 2 years ago, = P

Present value of machine = Rs.40000

Time, n = 2 years

Rate of depreciates, R = 20% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Value = P (1 - R/100)^n [∵ Rate decreases]

⇒ 40000 = P (1 - 20/100)^2

⇒ 40000 = P (1 - 1/5)^2

⇒ 40000 = P (4/5)^2

⇒ 40000 = P × 16/25

⇒ P = 40000 × 25/16

⇒ P = 2500 × 25

⇒ P = 62500

∴ Value of a machine 2 years ago is Rs.62500.

Question: 11

The annual rate o

Solution:

Let 3 years ago population = P

Present population = 33275

Time, n = 3 years

Increases rate, R = 10% per annum

Now,

Amount (A) = P (1 + R/100)^n [Where, A = Amount with compound interest

P = Present value

R = Annual interest rate

n = Time in years]

∴ Population = P (1 + R/100)^n

⇒ 33275 = P (1 + 10/100)^3

⇒ 33275 = P (1 + 1/10)^3

⇒ 33275 = P (11/10)^3

⇒ 33275 = P × 1331/1000

⇒ P = 33275 × 1000/1331

⇒ P = 25 × 1000

⇒ P = 25000

∴ 3 years ago population is 25000.

Question: 12

If the simple int

Solution:

Interest rate, R = 5% per annum

Time = 3 years

Simple interest = Rs.1200

Simple interest = PRT/100

⇒ 1200 = (P × 5 × 3)/100

⇒ 1200 = P × 15/100

⇒ P = 1200 × 100/15

⇒ P = 8000

Now,

Amount (A) = P (1 + R/100)^n

= 8000 (1 + 5/100)^3

= 8000 (1 + 1/20)^3

= 8000 (21/20)^3

= 8000 × 9261/8000

= 9261

∴ Amount = 9261

∴ Compound interest = Rs.(9261 – 8000) [∵∵CI = A – P]

= Rs.1261

Question: 13

If the compound i

Solution:

Compound interest, CI = Rs.510

Interest rate, R = $12\frac{1}{2}$% = 25/2% per annum

Time = 2 years

CI = P (1 + R/100)^n – P

⇒ 510 = P (1 + (25/2)/100)^2 – P

⇒ 510 = P (1 + 1/8)^2 – P

⇒ 510 = P (9/8)^2 – P

⇒ 510 = 81P/64 – P

⇒ 510 = (81P – 64P)/64

⇒ 510 = 17P/64

⇒ P = 510 × 64/17

⇒ P = 30 × 64

⇒ P = 1920

Now,

SI = PRT/100

= (1920 × 25/2 × 2)/100

= (1920 × 25)/100

= 480

∴ Simple interest = Rs.480

Question: 14

The sum that amou

Solution:

Amount, A = Rs.4913

Interest rate, R = (25/4)% per annum

Time = 3 years

Amount (A) = P (1 + R/100)^n

⇒ 4913 = P (1 + (25/4)/100)^3

⇒ 4913 = P (1 + 1/16)^3

⇒ 4913 = P (17/16)^3

⇒ 4913 = P × 4913/4096

⇒ P = 4913 × 4096/4913

⇒ P = 4096

∴ Sum = Rs.4096

Question: 15

At what rate per

Solution:

Present value, P = Rs.7500

Amount, A = Rs.8427

Time, n = 2 years

Now,

Amount (A) = $P (1 + R/100)^n$

$\Rightarrow 8427 = 7500 (1 + R/100)^2$

$\Rightarrow (1 + R/100)^2 = 8427/7500$

$\Rightarrow (1 + R/100)^2 = (53/50)^2$

$\Rightarrow (1 + R/100) = (53/50)$

$\Rightarrow R/100 = 53/50 – 1$

$\Rightarrow R/100 = (53 – 50)/50$

$\Rightarrow R = 3/50 \times 100$

$\Rightarrow R = 6$

$\therefore$ Rate = 6%