2. Insurance and Annuity

Exercise 2.1

1. Find the premium on a property worth ₹ 25, 00,000 at 3% if

i) the property is fully insured

ii) the property is insured to the extent of 8% of its value.

Solution:
Property value = ₹ 25, 00,000
Rate of interest = 3%
i) The property is fully insured:
Amount of premium

$$\rightarrow = 2500000 \times \frac{3}{100}$$

= ₹ 75000

ii) The property is insured to the extent of 80%:
Policy value

$$\rightarrow = 2500000 \times \frac{80}{100}$$

= ₹ 2000000
Amount of premium at the rate 3%

$$= 2000000 \times \frac{3}{100} = ₹\,60000$$

i) ₹ 75000. ii) ₹ 60000

2. A shop is valued at ₹ 3,60,000 for 75% of its value If the rate of the premium is 0.9%, find the premium Paid by the owner of the shop. Also, find the agent's Commission, if the agent gets commission at 15% of the premium.

Solution:
The value of the shop = ₹ 360000
Policy value of the shop is 75% of the value of the shop.
∴ Policy value of the shop

$$= 360000 \times \frac{75}{100}$$

= ₹ 270000
Rate of premium is 0.9%

∴ Amount of premium

$= 270000 \times \frac{0.9}{100}$

= ₹ 2430

Premium paid by the owner is ₹ 2430

Commission of an agent:

Commission at 15% of the premium of ₹ 2430

$= 2430 \times \frac{15}{100} = \frac{36450}{100}$

= ₹360.50

Agent's commission is ₹ 364.50.

3. A person insure his office valued at ₹ 500000 for 80% of its value. Find the rate of premium, if he pays ₹ 13000 as premium. Also, Find agent's commission At 11%.

Solution:

Value of office = ₹ 500000

Policy value is 80% of the value.

∴ policy value

$\rightarrow = 500000 \times \frac{80}{100}$

= ₹ 400000

Let the rate of the premium be x %

∴ amount of premium

$\rightarrow = 400000 \times \frac{r}{100}$

But the premium paid is ₹ 13000.

$\therefore 13000 = 400000 \times \frac{r}{100}$

$\therefore r = \frac{13000 \times 100}{400000}$

$\therefore r = 3.25\%$

Rate of premium is 3.25%

Agent's commission:

Amount of premium = ₹ 13000

Rate of commission = 11%

∴ agent's commission

$\rightarrow = 13000 \times \frac{11}{100}$

Agent's commission = ₹ 1430.

4. A building is insured for 75% of its value. The annual Premium at 0.70 per cent amount to ₹ 2625. If the building is damaged to the extent of 60% Due to fire, how

much can be claimed under the policy?

Solution:
Let the value of the building be ₹x.
Then the policy value of the building
$= x \times \frac{75}{100}$
$= ₹ \frac{3x}{4}$
Rate of premium is 0.07%
Premium amount = ₹ 2625
Amount of the premium = policy value × rate of premium
$\therefore 2625 = \frac{3x}{4} \times \frac{0.07}{100}$
$\therefore x = \frac{2625 \times 4 \times 100}{3 \times 0.07}$
$\therefore \ x = 50000$
∴ the value of the building = ₹ 5,00,000.
Damage = 60% of the value of the building.
$= 500000 \times \frac{60}{100} = ₹ 300000$
Policy value of the building
$= \frac{3x}{4}$
$= \frac{3}{4} \times 500000 = ₹ 375000.$
$claim = \frac{policy\ value}{property\ value} \times loss$
$= \frac{375000}{500000} \times 300000 = ₹ 225000$
∴ Claim = ₹ 225000

5. A stock worth ₹ 700000 was insured for ₹ 450000 Fire burnt stock worth ₹ 300000 completely and Damage the remaining stock to the extent of 75% of its value. What amount can be claimed under the policy?

Solution:
Value of the stock = ₹ 700000
Policy value of the stock = ₹ 450000
Value of the stock burnt = ₹ 300000
The value of the remaining stock = (₹ 700000 – 300000)
= ₹ 400000
Damage to the remaining stock
$= 400000 \times \frac{75}{100} = ₹ 300000$

Total loss = ₹ (300000 + 300000)
= ₹ 600000.

$claim = \frac{policy\ value}{stock\ value} \times loss$

$= \frac{450000}{700000} \times 600000$

= 385714.28 = 385714.30
Amount to be claimed is ₹ 385714.30

6. A cargo of rice was insured at 0.625% to cover 80% of Its value. The premium paid was ₹ 5250. If the price of rice is ₹ 21 per kg, find the quality of rice (in kg) in the cargo.

Solution:
Let the value of a cargo of rice be ₹ x.
The policy value of the cargo is 80% of x.
∴ The policy value of the cargo

$\rightarrow = ₹\, x \times \frac{80}{100} = ₹\, \frac{4x}{5}$

The rate of premium = 0.625%
The premium paid= ₹ 5250
Amount of the premium = policy value × Rate of premium

$\therefore 5250 = \frac{4x}{5} \times 0.625 \times \frac{1}{100}$

$\therefore 5250 = \frac{x}{200}$

∴ x = 5250 × 200 ∴ x = ₹ 1050000
The value of the cargo is ₹ 10, 50,000.
If the value of rice is ₹ 21 per kg, then the cargo contains

$\frac{1050000}{21} = 50000$ kg of price.

The quality of rice in the cargo is 50,000 kg.

7. 6000 Articles coasting ₹ 200 per dozen were insured Against fire for ₹ 2, 40,000. If 20% of the articles were burnt And 7200 of the remaining articles were damaged to the extend
Of 80% of their value, find the amount that can be claimed under The policy.

Solution:
The number of articles = 60000

$= \frac{60000}{12} = 5000\ dozen$

Cost of one dozen articles = ₹ 200
∴ the cost of 5000 dozen articles
= ₹ 200 × 5000 = ₹ 10, 00,000.

Policy value of the articles = ₹ 2, 40,000.
The number of articles completely burnt
$\rightarrow = 60000 \times \frac{20}{100} \times 12000$
$\rightarrow = \frac{12000}{12}$
= 1000 dozen
The value of the burnt articles,
= ₹ 200 × 1000 = ₹ 2, 00,000. ..... (1)
80% of 7200 articles were damaged
$7200 \times \frac{80}{100} = 5760.$
$\rightarrow \frac{5760}{12} = 480\ dozen$
The value of the damaged articles,
= ₹ 200× 480 = ₹ 96,000 .... (2)
Total loss = ₹ (200000 + 96000) .... (From 1 and 2)
= ₹ 2, 96,000.
$Claim = \frac{policy\ value}{property\ value} \times loss$
$= \frac{240000}{1000000} \times 296000$
= ₹ 71040
∴ ₹ 71040 can be claimed.

8. The rate of premium is 2% and other expenses are 0.75%. A cargo worth ₹ 350100 is to be insured so That all its value and the cost of insurance will be Recovered in the event of total loss.

Solution:
Let the policy value of the cargo be ₹ 100, including the
Premium and other expenses.
The rate of premium is 2%
Other expenses are 0.75%
∴ The premium ₹ 2 and the other expenses ₹ 0.75
∴ the value of the cargo
= ₹ [100-(2+0.75)]= ₹ 97.25
When the value of the cargo is ₹ 97.25,
The policy value is ₹ 100.
Therefore, when the value of the cargo is ₹ 351100, the
Policy value of the cargo.
$= \frac{100 \times 350100}{97.25}$

$= 360000$

The policy value of the cargo is ₹ 360000.

9. A property worth ₹ 4, 00,000. Is insured with three Companies, A B and C. the amount insured with These companies are ₹ 160000, ₹ 100000 and ₹ 140000 respectively. Find the amount recoverable From each company in the event of a loss to the Extent of ₹ 9000.

Solution:

Company	Amount insured
A	₹ 160000
B	₹100000
C	₹140000
Total	₹400000

$$Claim = \frac{policy\ value}{property\ value} \times loss$$

Claim from Company A:

$$= \frac{1600000}{400000} \times 900 = ₹\,3600$$

Claim from Company B:

$$= \frac{100000}{400000} \times 9000 = ₹\,2250$$

Claim from Company C:

$$= \frac{140000}{400000} \times 9000 = ₹\,3150.$$

10. A car valued at ₹ 800000 is insured for ₹ 500000. The rate of premium is 5% less 20%. How much will the Owner bear including the premium, if value of the car is Reduced to 60% of its original value.

Solution:

The value of a car = ₹ 8, 00,000.

The policy value of a car = ₹ 5, 00,000.

The rate of premium = 5% - (20% of 5)

= 5% - 1% = 4%

Amount of premium = policy value × rate of premium

$$= 500000 \times \frac{4}{100} = ₹\,20000$$

The value of the car is reduced to 60% of its original value.

∴ The value of the car

$= ₹\,800000 \times \frac{60}{100}$
$= ₹\,480000$
Loss $= ₹\,(800000 - 480000) = ₹\,320000$
$= ₹\,320000.$
$claim = \frac{Insured\ value}{value\ of\ the\ car} \times loss$
$= \frac{500000}{800000} \times 320000 = ₹\,200000.$
Loss the owner bears = loss - claim + premium
$= ₹\,(320000 - 200000 + 20000)$
$= ₹\,140000$

11. A shop and a godown worth ₹ 100000 and ₹ 200000 respectively were insured through an Agent who was paid 12% of the total premium. If the shop was insured for 80% and the godown for 60% of their respective values, find the agent's commission, Given that the rate of premium was 0.80% less 20%.

Solution:
The value of the shop = ₹ 100000.
The value of the godown = ₹ 200000
Insured value of the shop
$= ₹\,100000 \times \frac{80}{100}$
$= ₹\,80000$ ... (1)
Insured value of the godown
$= ₹\,200000 \times \frac{60}{100}$
$= ₹\,120000$ ...(2)
Total policy value = ₹ (80000+120000)
..... (From 1 and 2)
$= ₹\,200000$
The rate of the premium = 0.80% less 20%
= 0.80% - (20% of 0.80)
= 0.80% - (20% of 0.08)
= 0.80% - 0.16% = 0.64%
Amount of premium on ₹ 200000.
$= ₹\,200000 \times \frac{0.64}{100} = ₹\,1280$
Agent's commission at 12% of the premium
$= ₹\,1280 \times \frac{12}{100} = ₹\,153.60$
Agent's commission is ₹ 153.60

12. The rate of premium on a policy of ₹ 100000 is ₹ 56 per thousand per annum. A rebate of ₹ 0.75 per Thousand is permitted, if the premium is paid annually. Find the net amount of premium payable, if the policy holder Pays the premium annually.

Solution:
The policy value = ₹ 100000.
The rate of premium = ₹ 56 per thousand per annum
If a rebate of ₹ 0.75 per thousand is permitted when the
Premium is paid annually, then the rate of premium
= ₹ (56 – 0.75) = ₹ 55.25
When the policy is ₹ 1000, the premium is ₹ 55.25
Then for the policy value of ₹ 100000
Net premium
$= \frac{100000}{1000} \times 55.25$
The policy holder pays ₹ 5525 premium annually.

13. A Warehouse valued at ₹ 40000 contains goods Worth ₹ 240000 the warehouse is insured against Fire for ₹ 16000 and the goods to the extent of 90% of their value goods worth ₹ 80000 are completely destroyed while the remaining goods are destroy to 80% of their value due to fire. The damage to the warehouse is to be extend of ₹ 8000. Find the total amount that can be claimed.

Solution:
The value of the warehouse = ₹ 40000
Goods in warehouse worth ₹ 240000
Goods is insured for 90% of its value
$= ₹\,240000 \times \frac{90}{100}$
$= ₹\,216000$
This is the policy value.
Goods worth ₹ 80000 are completely destroyed
∴ loss is ₹ 80000.
$Claim = \frac{policy\ value}{value\ of\ goods} \times loss$
$= \frac{216000}{240000} \times 80000$
= ₹ 72000 .... (1)
The remaining goods, i.e. goods worth
₹ (240000 – 80000) = ₹ 160000 was destroyed to 80%
∴ The value of the remaining goods.
$= ₹\,160000 \times \frac{80}{100}$
= ₹ 128000.

Loss incurred = ₹ 128000

$$claim = \frac{ploicy\ value}{value\ of\ the\ goods} \times loss$$

$$= \frac{216000}{240000} \times 128000$$

= ₹ 115200.. (2)

The damage to the warehouse = ₹ 8000

The value of the warehouse = ₹ 40000

Policy value of the warehouse = ₹ 16000

Claim for the warehouse

$$= \frac{16000}{40000} \times 8000$$

= ₹ 3200.. (3)

Total claim = ₹ (72000 + 115200 + 3200)

..... (From 1, 2 and 3)

= ₹ 190400.

The total amount that can be claimed is ₹ 190400.

14. A person takes a life policy for ₹ 200000 for a Period of 20 years. He pays premium for 10 years
During which bonus was declared at an average rate of ₹ 20 per year per thousand. Find the paid up value of the policy if the discontinues paying premium after 10 years.

Solution:

Policy value = ₹ 200000

Rate of bonus = ₹ 20 per year per thousand

Bonus for 1 year on the policy of ₹ 200000

$$= \frac{200000}{1000} \times 20 = ₹\ 4000$$

∴ bonus for 10 years = ₹ 4000 × 10 = ₹ 40000

Period of policy 20 years

∴ yearly premium to be paid

$$= \frac{200000}{20} = ₹\ 10000$$

∴ premium paid for 10 years = ₹ 10000 × 10

= ₹ 100000.

Paid up value of the policy = premium paid + bonus

= ₹ (100000 + 40000)

= ₹ 140000

∴ The paid up value of the policy is ₹ 140000.