1.Set

Q.1) S is the set of all residents in Satara.

M is the set of all residents in Maharashtra.

A is the set of all residents in Aurangabad.

B is the set of all residents in India.

U is the set of all residents in Uttar Pradesh. (4 marks)

i) Write the subset relation between the sets.

ii) Which set can be the Universal set for above sets?

Ans : i) a) All residents of Satara are residents of India.

$\therefore S \subseteq B$

b) All residents of Satara are residents of Maharashtra.

$\therefore S \subseteq M$

c) All residents of Aurangabad are residents of India.

$\therefore A \subseteq B$

d) All residents of Aurangabad are residents of Maharashtra.

∴ A ⊆ M

e) All residents of Uttar Pradesh are residents of India.

∴ U ⊆ B

f) All residents of Maharashtra are residents of India.

∴ M ⊆ B

ii) Satara, Aurangabad, Uttar-pradesh, Maharashtra is all elements of India.

∴ Set B can be the Universal set for above sets.

2) A = { 1, 4, 9, 10, 11}, B = { 9, 10, 11, 12}, C = {9, 10}, D = {1, 8}, then which of the following statements are true and which ones are false? (4 marks each)

i) A⊆B, ii) B⊆C, iii) C⊆B , iv) D ⊆ A

Ans : Given,

A = { 1, 4, 9, 10, 11}

B = { 9, 10, 11, 12}

C = {9, 10}

D = {1, 8}

i) A⊆B

This statement is a false.

ii) B⊆C

This statement is a false.

iii) C⊆B

This Statement is a true.

iv) D ⊆ A

This statement is a true.

3) A = { 10, 20, 30, 40 }, B = { 20, 40, 60, 80, 100 } then n(A∪B) = n (A) + n (B) - n (A∩B) verify the above rule. (3 marks)

Ans : Given A = { 10, 20, 30, 40 }

In set A, there are 10, 20, 30, 40 i.e. 4 elements.

∴ n(A) = 4 ..... (1)

B = { 20, 40, 60, 80, 100 }

In set B, there are 20, 40, 60, 80, 100 i.e. 5 elements.

∴ n(B) = 5 …….. (2)

Now

(A∪B) = { 10, 20, 30, 40, 60, 80, 100 }

∴ n (A∪B) = 7 …….... (3)

Similarly, (A∩B) = { 20, 40 }

∴ n (A∩B) = 2 …….... (4)

Therefore,

∴ n (A∪B) = n (A) + n (B) - n (A∩B)

7 = 4 + 5 - 2 ... (from 1, 2, 3, 4)

7 = 9 - 2

7 = 7

∴ Left hand side = Right hand side.

∴ n (A∪B) = n (A) + n (B) - n (A∩B).

4) If n (A) = 17, n (B) = 23, n (A∩B) = 2 then find (A∪B) (3 marks)

Ans : Given , n (A) = 17, n (B) = 23, n (A∩B) = 2,

n (A∪B) = ?

∴ n (A∪B) = n (A) + n (B) - n (A∩B).

n (A∪B) = 17 + 23 - 2

n (A∪B) = 40 - 2

∴ n (A∪B) = 38.

5) If n (S∪T) = 29, n (S) = 15, n (S∩T) = 12 then find n (T) = ? (3 marks)

Ans : we know that,

n (S∪T) = 29, n (S) = 15, n (S∩T) = 12, n (T) = ?

n (S ∪ T) = n (S)+ n (T)- n (S∩T)

∴ 29 = 15 + n (T) - 12

∴ 29 = 15 - 12 + n (T)

∴ 29 = 3 + n (T)

∴ 29 - 3 = n (T)

∴ n(T) = 26.