Week 1 - Long Descriptive Questions - Discrate Mathematical

1. In a competition, a school awarded medals in different categories. 36 medals in dance, 12 medals in dramatics and 18 medals in music. If these medals went to a total of 45 persons and only 4 persons got medals in all the three categories, how many received medals in exactly two of these categories?

ANS:

The total number of medals: 36+12+18= 66.

So, 66 medals are awarded to 45 persons.

12 of them have been awarded to 4 persons.

The other 54 medals have been awarded to 41 persons.

So, there are 54–4= 13 persons with two medals each.

In a Three-Set problem, with say, Set A, B and C –

A B

IA IIAB IB

IIAC III IIBC

IC

C

Let I, II and III be the total number of persons who received exactly one, two and three medals each respectively.

Let S be the total number of medals given in the competition.

Clearly, total number of participants= I + II + III= let's name it X

So needless to say, overall, S number of medals were distributed among X number of individuals where every person can only get one, two or three medals each, and hence S > X

Now for ANY Three-Set Venn diagram we can say that –

S - X = (2\*III) + II

The above statement denotes the total number of participants who received more than one medal each, meaning who got two or three medals each, given by S - X

In the given problem statement, III = 4 , S = 36 + 12 + 18 = 66 and X = 45 and we need to find II

Using the relation, we can find II = 66 - 45 - 8 = 13

2. Which of the following is an equivalence relation?

a) The relation R on Z defined by aRb if a 2 − b 2 ≤ 7.

b) The relation R on Z defined by aRb if 2a + 5b ≡ 0 (mod 7).

c) The relation R on Z defined by aRb if a + b ≡ 0 (mod 5).

d) The relation R on Z defined by aRb if a 2 + b 2 = 0.

ANS: d

d) The relation R on Z defined by aRb if a^2 + b^2 = 0:

Reflexivity: This relation is reflexive because for any integer a, a^2 + a^2 = 0 is true.

Symmetry: It is symmetric because if a^2 + b^2 = 0, then b^2 + a^2 = 0 is also true.

Transitivity: It is transitive because if a^2 + b^2 = 0 and b^2 + c^2 = 0, then a^2 + c^2 = 0 is true.