ASSIGNMENT 11

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Discrete Mathematics

Q1(a): There are 10 telegrams and 2 messenger boys. In how many different ways can the telegrams be distributed to the messenger boys if the telegrams are distinguishable?

Solution: Every telegram has has 2 messenger boys to choose from the given 10 telegrams. We need to find the number of subsets:

$$S = S_1 x S_2 .... x S_{10}$$
$$\implies 2^{10}$$

So, there are 2^{10} different ways in which 10 telegrams can be distributed among the messenger boys.

Q1(b): In how many different ways can the telegrams be distributed to the messenger boys and then delivered to 10 different people if the telegrams are distinguishable?

Solution: 10 telegrams of n different ways can be distributed among 10 different boys in $n * 10!$ ways. As there are 2 boys among which these telegrams have to be distributed, so:

$$2^{10} * 10!$$

So, there are $2^{10} * 10!$ ways in which these telegrams can be distributed if the telegrams are distinguishable.

Q1(c): Solve (a) under the assumption that telegrams are indistinguishable.

A
messenger can get either $0, 1, 2, 3....., 10$ telegrams if all telegrams are indistinguishable, which adds up to 11 ways.

Q2(a): Find the sum of all 4-digit numbers that can be obtained by using the digits 2, 3, 5 and 7?

Solution: As the number is a 4-digit, so we have 4 numbers. So, there are a total of 256 different ways in which these 4 numbers can be represented.
Also, these number can be in units, tens, hundreds or thousands:

$$\implies 256/4 = 64$$

$$= 17 * 6(64 + 17) * 64 * (10 + 17) * 64 * 1000$$

$$= 1208768$$

Therefore, the sum of all 4-digit numbers that can be obtained by using the digits 2, 3, 5 and 7 is 1208768.
Q2(b): Find the sum of all 4-digit numbers that can be obtained by using the digits 2, 3, 5 and 7 and no digit is repeated?

Solution: There are 4 numbers and no digit is repeated so, we have:

$$4 * 3 * 2 * 1$$

$$= 24 \text{ ways}$$

Also, these number can be in units, tens, hundreds or thousands:

$$\implies 3 * 2 * 1$$

$$= 6$$

So, there are:

$$17 * (6 + 17) * 6 * (10 + 17) * 6 * (100 + 17) * 6 * 1000$$

$$= 113322$$

Therefore, the sum of all 4-digit numbers that can be obtained by using the digits 2, 3, 5 and 7 and no digit is repeated is 113322.