**Assignment 17.1**

A test is conducted which is consisting of 20 MCQs (multiple choices questions) with every MCQ having its four options out of which only one is correct. Determine the probability that a person undertaking that test has answered exactly 5 questions wrong.

**Solution**

Given:

No. of trials (n) = 20

Count of success (k) = n – 5 = 20-5 = 15

Count of failure (n-k) = 20 – 15 = 5

Probability of success (s) = ¼

Probability of failure (1-s) = 1- ¼

We will be using binomial distribution to solve this problem:

P (‘k’ successes in ‘n’ trials) = *C* (*n*, *k*) \* (s)k \* (1−*s*) (*n*−*k*)

C (n, k) is called the coefficient for binomial distribution or binomial coefficient. It is on this coefficient that the distribution is named.

**C (n, k) is evaluated as below:**

1. When k < ( n / 2) then C (n, k) = *n*! / (( *k*! (*n*−*k*)!))
2. When k > ( n / 2 ) then C ( k, n, s ) = C ( n – k, n, 1 – s)

As, k < ( n / 2 )

P (‘k’ successes in ‘n’ trials) = ( *n*! / (( *k*! (*n*−*k*)!)) \* (s)k \* (1−*s*) (*n*−*k*)

P ( answering 5 wrong answer out of 20)

= ( (20\*19\*18\*17\*16) / (5\*4\*3\*2\*1) ) \* (1/4)15 \* (1 - 1/4) (20-15)

= ( 1860480 / 120 ) \* .000000000932 \* .24

= 0.0000034

**Probability of answering 5 wrong questions by a person is 0.0000034**.