Problem 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:

Here, n = 20

Here the probability of success = probability of giving a right answer = p = 1/4

Hence, the probability of failure = probability of giving a wrong answer =q
= 1 - p
= 1 – 1/4 = 3/4

When we substitute these values in the formula for Binomial distribution we get,

P (exactly 5 out of 20 answers incorrect) = C (20, 5) * (1/4) ^15 * (3/4) ^ 5

= 0.0000034 (approx.)

Thus, the required probability is **0.0000034** approximately.

Problem 2:

A die marked A to E is rolled 50 times. Find the probability of getting a “D” exactly 5 times.

Solution –

Here, n = 50, k = 5, n - k = 45.

The probability of success = probability of getting a “D” = p = 1/5

Hence, the probability of failure = probability of not getting a “D” = 1 - p = 4/5.

When we substitute these values in the formula for Binomial distribution we get,

P (getting D exactly 5 times) = C (50, 5) * (1/5) ^5 * (4/5) ^ 45

=0.0295

Problem 3:

Two balls are drawn at random in succession without replacement from an urn containing 4 red balls and 6 black balls. Find the probabilities of all the possible outcomes.

Solution:

First determine the probabilities of the events.

Events	Probability
RR	= (4/10) * (3/9) = 2/15
RB	= (4/10) * (6/9) = 4/15
BR	= (6/10) * (4/9) = 4/15
BB	= (6/10) * (5/9) = 1/3

The probability of 0 black balls or 2 red balls (RR) is 2/15
The probability of 1 black ball or 1 red ball is (RB or BR) is 4/15+4/15 = 8/15
The probability of 2 black balls (BB) or 0 red balls is 1/3