

100 Marks  
10/12 minutes  
# Concept of Probability

Say the experiment of tossing a coin. There are only two possible outcomes; either the 'head' or the 'tail' falls uppermost. If we toss the coin a very large number of times and count the no. of times head or tail comes, this gives the fraction that the measured probability  $p$  of obtaining a head and the measured probability  $q$  of obtaining a tail. Probability outcome for head will be half and that for tail will also be half. Thus  $p = q = \frac{1}{2}$ . Thus, the probability of occurrence of an event is the ratio of the number of cases in which the event occurs to the total number of cases, provided the total number of cases is very large.

If an event occurs in  $a$  ways and fail to occur in  $b$  ways, and each of these ways is equally likely, then the probability of its occurring is  $\frac{a}{a+b}$ , and the probability of its failing is  $\frac{b}{a+b}$ .

The sum of the two probabilities  $(\frac{a}{a+b} + \frac{b}{a+b})$  is, however, 1 because the event must either occur or fail.

Consider the case of two distinguishable coins marked 1 and 2 (say a silver coin and a copper coin). Say a number of times the coin is tossed and say counted the following events:

- (i) Heads of both fall uppermost - -  $a_1 a_2$
- (ii) Tails of both fall uppermost - -  $b_1 b_2$
- (iii) Head of 1 and Tail of 2 uppermost - -  $a_1 b_2$
- (iv) Tail of 1 and Head of 2 uppermost - -  $b_1 a_2$

Here  $a$  denotes head,  $b$  denotes tail,  $a_1$  signifies that the head of 1 is uppermost, and so on.