NCERT: Class XII

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13.4.4 Find the probability distribution of
(i) number of heads in two tosses of a coin.
(ii) number of tails in the simultaneous tosses of three coins.
(iii) number of heads in four tosses of a coin.

Solution:
(i) number of heads in two tosses of a coin.
Given, number of trails = n = 2
probability of getting head for one coin = p = $\frac{1}{2}$
probablity of not getting a head = q = 1-p = $\frac{1}{2}$
let X represent the number of heads in two tosses of a coin
$\therefore$ the values of X = $\{0, 1, 2\}$
by using binomial distribution

$$P(X) = {}^{n}C_{X} p^{X} q^{n-X} \tag{13.4.4.1}$$

X	0	1	2
P(X)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Table 13.4.4.1: Probability Distribution of X

(ii) number of tails in the simultaneous tosses of three coins.
Given, number of trails= n = 3
probability of getting tail for one coin = p = $\frac{1}{2}$
probalility of not getting tail = q = 1-p = $\frac{1}{2}$
let X represents the number of tails in simultaneous tosses of three coins
$\therefore$ the values of X = $\{0, 1, 2, 3\}$
by using binomial distribution

$$P(X) = {}^{n}C_{X} p^{X} q^{n-X} \tag{13.4.4.2}$$

X	0	1	2	3
P(X)	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$

Table 13.4.4.2: Probability Distribution of X

(iii) number of heads in four tosses of a coin.
given, number of trails n = 4
probability of getting a head for one coin = p = $\frac{1}{2}$
probability of not getting a head = q = 1-p = $\frac{1}{2}$
let X represents the number of tails in simultaneous tosses of three coins
$\therefore$ the values of X = {0,1,2,3,4}
by using binomial distribution

$$P(X) = {}^{n}C_{X} p^{X} q^{n-X} \tag{13.4.4.3}$$

X	0	1	2	3	4
P(X)	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{6}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

Table 13.4.4.3: Probability Distribution of X