

Solution 12.13.3.81

Aditya Vikram Singh*

Question 22 Eight coins are tossed together. The probability of getting exactly 3 heads is

- (A) $\frac{1}{256}$
- (B) $\frac{7}{32}$
- (C) $\frac{5}{32}$
- (D) $\frac{3}{32}$

Solution: The probability of getting a head is

TABLE 4
RANDOM VARIABLE AND PROBABILITY TABLE

Random independent variable	value of R.V	Description
n	8	Total no. of coin toss
X	$0 \leq X \leq 8$	no. of heads

$$p = \frac{1}{2} \quad (1)$$

The pmf for the binomial distribution is

$$p_X(k) = \binom{n}{k} p^k (1-p)^{n-k} \quad k = 0, 1, 2, \dots, 8 \quad (2)$$

(3)

For exactly 3 heads

$$p_X(3) = \binom{8}{3} p^3 (1-p)^5 \quad (4)$$

$$= 56 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^5 \quad (5)$$

$$= \frac{7}{32} \quad (6)$$

Hence, the probability of getting 3 heads is 0.21875