A fair coin is tossed n times. If the probability that head occurs 6 times is equal to the probability that head occurs 8 times, n is

(A) 6 (B) 8 (C) non-real (D) 14

Solution

$$P(6) = {}^{n}C_{6}\left(\frac{1}{2}\right)^{6}\left(\frac{1}{2}\right)^{n-6} = {}^{n}C_{6}\left(\frac{1}{2}\right)^{n}$$

$$P(8) = {}^{n}C_{8}\left(\frac{1}{2}\right)^{8}\left(\frac{1}{2}\right)^{n-8} = {}^{n}C_{8}\left(\frac{1}{2}\right)^{n}$$

Given, P(6) = P(8)

$$\therefore {}^{n}C_{6}\left(\frac{1}{2}\right)^{n} = {}^{n}C_{8}\left(\frac{1}{2}\right)^{n}$$

$$\therefore {}^{n}C_{6} = {}^{n}C_{8} = {}^{n}C_{n-8}$$

$$\therefore 6 = n - 8$$

$$\therefore n = 14$$

Hence, (D)