

Q-10.13.3.10

Yash Patil - EE22BTECH11058

Question: 6 boys and 6 girls sit in a row at random. The probability that all the girls sit together is

- 1) $\frac{1}{432}$
- 2) $\frac{1}{12}$
- 3) $\frac{1}{132}$
- 4) none of the above

Solution: Let $n(k)$ denote the number of ways in which k people can sit in a row.

$$n(k) = k! \quad (1)$$

\therefore for 6 boys and 6 girls, total number of arrangements

$$= n(12) \quad (2)$$

$$= 12! \quad (3)$$

Parameter	Value	Description
X	1-12	Represents the number of selected people sitting together

Finding pmf:

$$p_X(k) = Pr(X = k) \quad (4)$$

$$= \frac{n(12 - k + 1) \times n(k)}{n(12)} \quad (5)$$

\therefore probability of 6 girls sitting together

$$= p_X(6) = Pr(X = 6) \quad (6)$$

$$= \frac{n(7) \times n(6)}{n(12)} \quad (7)$$

$$= \frac{7! \times 6!}{12!} \quad (8)$$

$$= \frac{1}{132} \quad (9)$$

\therefore option 3 is correct.