

# QUESTION : 12.13.3.84

ROLL NO:EE22BTECH11027

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12.13.3.84. Two cards are drawn from a well shuffled deck of 52 playing cards with replacement. The probability, that both cards are queens, is

- A  $\frac{1}{13} \times \frac{1}{13}$
- B  $\frac{1}{13} + \frac{1}{13}$
- C  $\frac{1}{13} \times \frac{1}{17}$
- D  $\frac{1}{13} \times \frac{4}{51}$

**Solution:** : Let  $Q$  be the event of selecting queens from the deck of 52 cards. There are 4 queens in a standard deck. So,

$$\begin{aligned} \Pr(Q) &= \frac{4}{52} \\ &= \frac{1}{13} \end{aligned} \quad (1)$$

Let  $E_1$  and  $E_2$  be the events representing success on first and second draw respectively. Here  $E_1$  and  $E_2$  are independent.

$$\Pr(E_1) = \Pr(Q) = \frac{1}{13} \quad (2)$$

$\therefore$  we are drawing with replacement, the probability remains the same as the first draw. So,

$$\Pr(E_2) = \Pr(Q) = \frac{1}{13} \quad (3)$$

Let  $S$  be the event that both cards are queens.

$$\begin{aligned} \Pr(S) &= \Pr(E_1 E_2) \\ &= \Pr(E_1) \times \Pr(E_2) \\ \therefore \Pr(S) &= \frac{1}{13} \times \frac{1}{13} \end{aligned} \quad (4)$$