

⑦ Let A and B be two events such that the probability that exactly one of them occurs is $\frac{2}{5}$ and the probability that A or B occurs is $\frac{1}{2}$. Then the probability of both of them occurring together is

soln Given $P(A \cup B) = \frac{1}{2}$.

$$P((A \cap \bar{B}) \cup (\bar{A} \cap B)) = \frac{2}{5}$$

$$\Rightarrow P(A \cap \bar{B}) + P(\bar{A} \cap B) = \frac{2}{5}$$

$$\Rightarrow P(A) - P(A \cap B) + P(B) - P(A \cap B) = \frac{2}{5}$$

$$P(A) + P(B) - P(A \cap B) - P(A \cap B) = \frac{2}{5}$$

$$P(A \cup B) - P(A \cap B) = \frac{2}{5}$$

$$P(A \cap B) = \frac{1}{2} - \frac{2}{5} = \frac{1}{10}$$

$$\therefore P(A \cap B) = \frac{1}{10}$$