

Question 5:

If $P(A) = \frac{6}{11}$, $P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$, find

- (i) $P(A \cap B)$ (ii) $P(A|B)$ (iii) $P(B|A)$

Solution:

Given, $P(A) = \frac{6}{11}$, $P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$

$$(i) \quad P(A \cup B) = \frac{7}{11}$$

$$\therefore P(A) + P(B) - P(A \cap B) = \frac{7}{11}$$

$$\Rightarrow \frac{6}{11} + \frac{5}{11} - P(A \cap B) = \frac{7}{11}$$

$$\begin{aligned} \Rightarrow P(A \cap B) &= \frac{11}{11} - \frac{7}{11} \\ &= \frac{4}{11} \end{aligned}$$

$$(ii) \text{ Since, } P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$\begin{aligned} \Rightarrow P(A|B) &= \frac{\frac{4}{11}}{\frac{5}{11}} \\ &= \frac{4}{5} \end{aligned}$$

$$(iii) \text{ Since, } P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$\begin{aligned} \Rightarrow P(B|A) &= \frac{\frac{4}{11}}{\frac{6}{11}} \\ &= \frac{4}{6} \\ &= \frac{2}{3} \end{aligned}$$

Determine $P(E|F)$ in the following.