Question 3:

If $P(A) = 0.8$, $P(B) = 0.5$ and $P(B|A) = 0.4$, find

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

Solution:

Given, $P(A) = 0.8, P(B) = 0.5$ and $P(B|A) = 0.4$

(i) $P(B|A) = 0.4$

$$\therefore \frac{P(A \cap B)}{P(A)} = 0.4$$

$$\Rightarrow \frac{P(A \cap B)}{0.8} = 0.4$$

$$\Rightarrow P(A \cap B) = 0.32$$

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

$$\Rightarrow P(A|B) = \frac{0.32}{0.5}$$

$$= 0.64$$

(iii) $$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\Rightarrow P(A \cup B) = 0.8 + 0.5 - 0.32$$

$$= 0.98$$