A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. The probability that it is actually a six is,

(A) $\dfrac{3}{8}$  (B) $\dfrac{1}{5}$  (C) $\dfrac{3}{4}$  (D) None of these

*Solution*

Let E be the event of occurrence of 6.

Then, $P(E) = \dfrac{1}{6}, P(\bar{E}) = \dfrac{5}{6}$

Let A be the event of man reporting the number to be 6.

Then, $P(A/E) = \dfrac{3}{4}$ as A/E means he is reporting 6 as 6 or he is telling the truth.

$P(A/\bar{E}) = \dfrac{1}{4}$ as $A/\bar{E}$ means he is not telling the truth.

Using Bayes' theorem, $P(E/A) = \dfrac{P(E)P(A/E)}{P(E)P(A/E) + P(\bar{E})P(A/\bar{E})}$

$\therefore P(E/A) = \dfrac{\dfrac{1}{6} \times \dfrac{3}{4}}{\dfrac{1}{6} \times \dfrac{3}{4} + \dfrac{5}{6} \times \dfrac{1}{4}} = \dfrac{3}{8}$

Hence, (A)