In a random experiment, a fair die is rolled until two fours are obtained in succession. The probability that the experiment will end in the fifth throw of the die is equal to   (2019 Main, 12 Jan I)

(a) $\dfrac{175}{6^5}$

(b) $\dfrac{225}{6^5}$

(c) $\dfrac{200}{6^5}$

(d) $\dfrac{150}{6^5}$

Since, the experiment should be end in the fifth throw of the die, so total number of outcomes are 6^5.

Now, as the last two throws should be result in two fours

$$\underline{\quad}\ \underline{\quad}\ \underline{\quad}\ \underline{4}\ \underline{4}$$
$$\text{(i)\ (ii)\ (iii)\ (iv)\ (v)}$$

So, the third throw can be 1, 2, 3, 5 or 6 (not 4). Also, throw number (i) and (ii) can not take two fours in succession, therefore number of possibililites for throw (i) and (ii) $= 6^2 - 1 = 35$

[∵ when a pair of dice is thrown then (4, 4) occur only once].

Hence, the required probability $= \dfrac{5 \times 35}{6^5} = \dfrac{175}{6^5}$