If two fuzzy sets A and B are given with membership functions $\mu A(x) = \{0.2, 0.4, 0.8, 0.5, 0.1\}$

$\mu B(x) = \{0.1, 0.3, 0.6, 0.3, 0.2\}$. Then the value of $\mu(A \cap B)$'will be

(A) {0.9, 0.7, 0.4, 0.8, 0.9}

(B) {0.2, 0.4, 0.8, 0.5, 0.2}

(C) {0.1, 0.3, 0.6, 0.3, 0.1}

(D) {0.7, 0.3, 0.4, 0.2, 0.7}

Solution:

To solve this task we consider the definition of sets. Classical sets – either an element belongs to the set or it does not. Classical sets are also called crisp (sets). Fuzzy set – admits gradation such as all tones between black and white. A fuzzy set has a graphical description that expresses how the transition from one to another takes place. This graphical description is called a membership function. Now that we have an idea of what fuzzy sets are, we can introduce basic operations on fuzzy sets. Similar to the operations on crisp sets we also want to intersect, unify and negate fuzzy sets. In Fuzzy Logic, intersection, union and complement are defined in terms of their membership functions. In our case the fuzzy intersection of two fuzzy sets A and B on universe of discourse X: $\mu_{A\cap B}(x) = min(\mu_A(x), \mu_B(x))$. The most commonly adopted t-norm is the minimum. That is, given two fuzzy sets A and B with membership functions $\mu_A(x)$ and $\mu_B(x)$. But here in our task, they are asking for complement of A intersection B and so the answer would be$\mu_{\overline{A}}(x) = 1 - \mu_A(x)$ or we can write $1 - min(A(x), B(x))$.

The minimum of $\mu A(x) = \{0.2, 0.4, 0.8, 0.5, 0.1\}$ and $\mu B(x) = \{0.1, 0.3, 0.6, 0.3, 0.2\}$ we can write $\{0.1, 0.3, 0.6, 0.3, 0.1\}$. The first value will be $1 - 0.1 = 0.9$, the second value is $1 - 0.3 = 0.7$, the third value will be $1 - 0.6 = 0.4$, the fourth value is$1 - 0.3 = 0.7$, the last value is $1 - 0.1 = 0.9$. We get $\{0.9, 0.7, 0.4, 0.7, 0.9\}$.

Answer: (A) {0.9, 0.7, 0.4, 0.8, 0.9}.