Q. Let $\alpha(a)$ and $\beta(a)$ be the roots of the equation

$(\sqrt[3]{1+a} - 1)x^2 + (\sqrt{1+a} - 1)x + (\sqrt[6]{1+a} - 1) = 0$ where $a > -1$. Then $\lim_{a \to 0^+} \alpha(a)$ and $\lim_{a \to 0^+} \beta(a)$ are (A) $-\frac{5}{2}$ and 1 (B) $-\frac{1}{2}$ and -1 (C) $-\frac{7}{2}$ and 2 (D) $-\frac{9}{2}$ and 3 [JEE 2012, 3M, –1M]

Sol. (B)

$$\left(\left(1+\frac{a}{3}\right)-1\right)x^2+\left(\left(1+\frac{a}{2}\right)-1\right)x+\left(1+\frac{a}{6}-1\right)=0$$

$$a\left(\frac{x^2}{3}+\frac{x}{2}+\frac{1}{6}\right)=0 \Rightarrow 2x^2+3x+1=0$$

$$\Rightarrow x=-\frac{1}{2},-1$$

$$\Rightarrow \lim_{a\to 0^+}\alpha(a) \text{ and } \lim_{a\to 0^+}\beta(a) \text{ are } -\frac{1}{2} \text{ and } -1$$