Q) If α and β are the distinct roots of the equation $x^2+(3)^{1/4}x+3^{1/2}=0$, then the value of $\alpha^{96}(\alpha^{12}-1)+\beta^{96}(\beta^{12}-1)$ is equal to :

As, $(\alpha^2+3)=-(3)^{1/4}.\alpha$

$\Rightarrow(\alpha^4+23\alpha^2+3)=3\alpha^2$ (On squaring)

$\therefore (\alpha^4+3)=(-)3\alpha^2$

$\Rightarrow\alpha^8+6\alpha^4+9=3\alpha^4$ (Again squaring)

$\therefore \alpha^8+3\alpha^4+9=0$

$\Rightarrow\alpha^8=-9-3\alpha^4$

(Multiply by α^4)

So, $\alpha^{12}=-9\alpha^4-3\alpha^8$

$\therefore \alpha^{12}=-9\alpha^4-3(-9-3\alpha^4)$

$\Rightarrow\alpha^{12}=-9\alpha^4+27+9\alpha^4$

Hence, $\alpha^{12}=(27)^2$

$\Rightarrow(\alpha^{12})^8=(27)^8$

$\Rightarrow\alpha^{96}=(3)^{24}$

Similarly $\beta^{96}=(3)^{24}$

$\therefore \alpha^{96}(\alpha^{12}-1)+\beta^{96}(\beta^{12}-1)=(3)^{24}\times52$