

$$Q \quad \lim_{n \rightarrow \infty} \int_{-\sqrt[3]{a}}^{\sqrt[3]{a}} \left(1 - \frac{t^3}{n}\right)^n t^2 dt$$

Ans. $\int_{-\sqrt[3]{a}}^{\sqrt[3]{a}} e^{(1 + \frac{t^3}{n} - 1)n} t^2 dt$

$$\int_{-\sqrt[3]{a}}^{\sqrt[3]{a}} e^{t^3} t^2 dt \Rightarrow$$

$$= \left. \frac{e^{t^3}}{3} \right|_{-\sqrt[3]{a}}^{\sqrt[3]{a}} = \frac{e^a}{3} - \frac{e^{-a}}{3} = 2\sqrt{2}$$

$$a = \ln(\sqrt{2} + \sqrt{3})$$