$$\int x^4 \log x \, dx$$

$$= \int \left(\frac{x^5}{5}\right)' \log x \, dx$$

$$= \frac{1}{5}x^5 \log x - \int \frac{x^5}{5} \times \frac{1}{x} \, dx$$

$$= \frac{1}{5}x^5 \log x - \frac{1}{5} \times \frac{1}{5}x^5 + C$$

$$= \boxed{\frac{1}{5}x^5 \log x - \frac{1}{25}x^5 + C} \quad (C\text{は定数})$$