Que 3: Local maximum value of the function $\log x^x$ is

A)   e

B)   1

C)   1/e

D)   2/e

Correct Answer: C

Solution :

         Let $f(x)=\log x/x$
$\Rightarrow$ $f'(x)=1/x^2-\log x/x^2$
         For maximum or minimum value of $f(x)$,
         $f'(x)=0$
         $f'(x)=(1-\log_e x)/x^2=0$
or $(1-\log_e x)/x^2=0$
$\therefore$ $\log x=1$ or $x=e$,
        which lie in $(0,\infty)$.
         For $x=e$, $d2y/dx^2=-1/e^3$, which is $-ve$.
             Hence y is maximum at $x=e$ and its maximum value $=\log e/e=1/e$.