4-1 (b) $T(n) = T(9n/10) + n$

$a = 1 \quad b = 10/9 \quad f(n) = n$

$\therefore \quad n^{\log_b a} = n^{\log_{10/9} 1} = n^0 = 1$

$\therefore \quad \frac{f(n)}{n^{\log_b a}} = n$

case 3 of master method & $T(n) = \Theta(n)$ Ans

4.1(c) $T(n) = 16T(n/4) + n^2$

$a = 16, \; b = 4, \; f(n) = n^2$

$n^{\log_b a} = n^{\log_4 16} = n^2$

$\therefore \quad \frac{f(n)}{n^{\log_b a}} = \frac{n^2}{n^2} = 1$

case 2 of master method $\Rightarrow$ $T(n) = \Theta(n^2 \lg n)$ Ans

4.1(d) $T(n) = 7T(n/3) + n^2$

$a = 7 \quad b = 3 \quad f(n) = n^2$

$\therefore \quad n^{\log_b a} = n^{\log_3 7}$

$\frac{f(n)}{n^{\log_b a}} = \frac{n^2}{n^{\log_3 7}} = n^{2 - \log_3 7}$

as $2 - \log_3 7 > 0$

$\therefore$ case 3 of master method holds & $T(n) = \Theta(n^2)$ Ans