Q:5)

$$T(n) = \Theta(\log n \cdot n^2) + T(n-2)$$

$$T(n) = T(n-2) + \Theta(n^2 \cdot \log n)$$

conqure time $= T(n-2)$
divide + combine $= \Theta(n^2 \cdot \log n)$

upper bound

$$T(n) = T(n-2) + \Theta(n^2 \cdot \log n)$$

$$= O(n) + \cancel{\Theta}(n^2 \cdot \log n)$$

$$= O(n) \cdot O(n^2 \log n)$$

$$= O(n^3)$$: ignoring lower order terms

loose bound.

if $n = 1$

$$c \cdot g(n) \leq f(n)$$

$$-(T-2) \leq \Theta(\log n \cdot n^2)$$

$$- \cancel{\Omega(n^2)} \le \Omega(n^2) < \Theta(n^2 \log n)$$

$\Omega(1)$ // $\Omega(n)$ it hold loose bound.

Q.6) $T(n) = T\left(\frac{9n}{10}\right) + (n^2 \cdot \sqrt{n})$

using master theorem.

$\Rightarrow \left(\frac{n}{b} = \frac{n}{10/9}\right)$

$= T\left(\frac{n}{10/9}\right) + (n^2 \cdot \sqrt{n})$

$a = 1$, $b = \frac{10}{9}$, $f(n) = n^2 \cdot \sqrt{n}$

Now

$n^{\log_b a}$ = putting values -

$\Rightarrow n^{\log_{10/9} 1}$

$\Rightarrow$ 1.11

if we add some value to $n^{1.11+()}$ the it become our $f(n)$. let $n^2 \cdot \sqrt{n}) = 2$

So let $\varepsilon = 0.89$

So

$n^{1.11+0.89} = \boxed{2}$

also

$\left(\frac{n}{10/9}\right)^2 \cdot \sqrt{\frac{n}{10/9}} \leq c \cdot n^2 \sqrt{n}$ let $c = 1/1.11$

$\frac{n^2}{(10/9)^2} \cdot \frac{n}{\sqrt{10/9}} \leq \frac{n^2 \sqrt{n}}{10/9}$

Hence prove $T(n) = \Theta(f(n))$