Name-Shuti Kanchi Section - AI & DS ROU Number - 2017970

Tutarial No-4

Ques-1. T(m) = 3T (m/2)+m2

 $\frac{dol}{dol}$ $T(n) = aT(n/b) + f(n^2)$ $a \ge 1, b \ge 1$

on comparing

 $A=3, b=2, f(n)=n^2$

Now, c= log b a = log 3 = 1.584

n = m 1.534 2 m2.

.'. f(n)>m²

... $T(n) = O(n^2)$

Quera. T(n) = 4T(n/2) + m2.

ay1, b>1

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

 $C = log_2 4 = 2$

 $m^{c} = m^{2} = f(m) = m^{2}$

 $o.T(m) = 0 (m^2 wg_2 n)$

 $T(n) = T(n/2) + 2^{n}$ Ques -3

 $f(n) = 2^n.$

 $c = \omega g_b \alpha = \omega g_2 c = 0$

 $\rightarrow T(m) = O(2^n)$

 $m^{c}=m^{o}=1$ t (n) >m2

dues 4.
$$T(n) = 2^n T(n/2) + n^n$$
 $a = 2^n$.

 $b = 2$, $f(n) = n^2$
 $c = \log_2 2^n$.

 $m^c = m^n$
 $f(n) = n^c$
 $f(n) = 0$ ($n^2 \log_2 n$)

dues $T(n) = 16T(n/4) + n$.

 $a = 16$, $b = 4$
 $f(n) = m$
 $c = \log_4 16 = \log_4 (4)^2 = 2\log_4 4$
 $= 2^n$
 $n^c = m^2$
 $f(n) \neq n^c$
 $T(n) = 0 (n^2)$

duestion 6. $T(n) = 2T(n/2) + n\log_2 n$.

 $a = 2$, $b = 2$
 $f(n) = n\log_2 n$.

 $c = \log_2 2 = 1$
 $n^c = m^2 = n$
 $n\log_2 n > n$

f(n) >nc

 $T(n) = O(n \log n)$

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Quest. T(m) = 2T(m/2) + m/\log m.

a = 2, b = 2, f(m) = h/\log n.

c = \log_2 2 = 1.

n^c = m^1 = m.

n = 2m.

\log m.

\log m.

T(m) = O(m).
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dust $T(n) = 2t (m/4) + n^{0.51}$ $a = 2, b = 4, f(m) = m^{0.51}$ $c = log_b a = log_4 2 = 0.5$ $n^c = n^{0.5}$ $n^{0.5} < n^{0.51}$ $f(n) > n^c$ $T(m) = 0 (n^{0.51})$

Ques 9, T(m)=0.5T(m/2)+1/m. a=0.5, b=2 $a\ge 1$ but here a is 0.5 So we of can't apply master's theorm.

Ques 10 T(n) = 16T(n/4) + m/4 a = 16, b = 4, f(n) = n/4 c = 16, b = 4, f(n) = n/4c = 16, c = 1

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Dues 7. T(m) = 2T(m/2) + m/\log m.

a = 2, b = 2, f(m) = m/\log n

c = \log_2 2 = 1

m^c = m^1 = m.

m \leq m

\log m

\log m

\log m

m \leq m \leq m
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dusb.
$$T(n) = 2t (m/4) + n^{0.51}$$
.
 $a = 2, b = 4, f(m) = n^{0.51}$.
 $c = log_{6}a = log_{4}2 = 0.5$.
 $n^{c} = n^{0.5}$.
 $n^{0.5} < n^{0.51}$.
 $f(n) > n^{c}$.
 $T(n) = 0 (n^{0.51})$.

Dues 9. T(m)=0.5T(m/2)+1/m. a=0.5, b=2 $a\ge 1$ but here a 15 0.5 So we 9 can't apply marter's Theorem.

Ques 10
$$T(n) = 16T(n/4) + m/4$$

 $a = 16$, $b = 4$, $f(n) = n/4$
 $a = 16$, $b = 4$, $f(n) = n/4$
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Dues 11 4T (m/2) + $\log m$. $a = 4, b = 2, f(m) = \log m$. $c = \log_b a = \log_2 4 = 2$ $m^c = m^2$ $f(m) = \log m$. $f(m) = \log m$. $f(m) < m^c$ $f(m) < m^c$ $T(m) = 0 (m^c)$ $= 0 (m^c)$

Dues Le T(m) = sgrt(m)t'(n/2) + log m $a = \sqrt{m}$, b = 2 $c = log_b a = log_2 \sqrt{m} = 1/2 log_2 m$ $o^3o = \frac{1}{2} log_2 m < log m$ $o^3o = f(m) > m^c$ $f(m) = \theta (m^{1.5} 649)$

Quests T(m) = 3T(m/2) + m. a = 3; b = 2 f(m) = m. $c = log_b a = log_2 3 = 1.5849$. $m^c = m^{1.5}849$ $m < m^{1.5}849$ $f(m) < m^c$ $T(m) = 0 (m^{1.5}849)$ Dues 11 4T (m/2) + $\log m$. a=4, b=2, $f(m) = \log m$. $c=\log_2 \alpha = \log_2 4 = 2$ $m^c=m^2$ $f(m) = \log m$. $f(m) < m^c$ $f(m) < m^c$ $T(m) = O(m^c)$ $= O(m^c)$

dues 18 T(m) = 8grt(m)t'(n/2) + log m $\alpha = \sqrt{m}$, b = 2 $c = log_b a = log_2 \sqrt{m} = 1/2 log_2 m$ $o^2o = \frac{1}{2} log_2 m < log m$ $o^2o = \frac{1}{2} log_2 m < log m$ $o^2o = f(m) > m^2$ $o^2o = 0$

Questy T(m) = 3T(n/2) + m. a = 3; b = 2 f(m) = m. $c = log_b a = log_2 3 = 1.5849$. $m^c = m^{1.5849}$ $m < m^{1.5849}$ $f(m) < m^c$ $T(m) = 0 (m^{1.5849})$

Unus 14
$$T(n) = 3T(n/3) + 8qrt(n)$$

 $0 = 3, b = 3$
 $c = log_b a = log_g 3 = 1$
 $n^c = m^4 = m$
As $sqrt(m) < m$.
 $f(m) < m^c$
 $T(m) = 0 (m)$.

Ques 15
$$T(m) = 4T(m/2) + m$$
.
 $a = 4$ $b = 2$
 $C = log_b a = log_2 4 = 2$
 $m^c = m^2$
 $m < m^2$ (for any constant f(m) < m^2
 $f(m) = 0$ (m^2

Ques 16
$$T(m) = 3T(m/4) + m \log m$$
.
 $a = 3$, $b = 4$, $f(m) = m \log m$.
 $c = \log_b a = \log_4 3 = 0.792$
 $m^c = m^{0.792}$
 $m^{0.792}$
 $m^{0.792}$
 $m \log m$.
 $T(m) = 0 (m \log m)$

Questy
$$T(n) = 3T(n/3) + 19rt(n)$$

 $\alpha = 3, b = 3$
 $c = 109ba = 1093 = 1$
 $n^{c} = n^{d} = n$
As $100 = 100 = 100$
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Quest 5
$$T(m) = 4T(m/2) + m$$
.
 $a = 4$ $b = 2$
 $C = log_b a = log_2 4 = 2$
 $m^c = m^2$.
 $m < m^2$ (for any constant.
 $f(m) < m^2$.
 $f(m) = 0 (m^2$.

Ques 16
$$T(m) = 3T(m/4) + m \log m$$
.
 $a = 3$, $b = 4$, $f(m) = m \log m$.
 $c = \log_b a = \log_4 3 = 0.792$
 $m^c = m^{0.792}$
 $m^{0.792}$ ($m \log m$.
 $T(m) = 0 (m \log m)$

Ques 17
$$T(n) = 3T(n/3) + n/2$$

 $a = 3$; $b = 3$
 $c = log_3 a = log_3 = 1$
 $f(n) = n/2$
 $n^c = n^1 = n$
As $n/2 \times n$
 $f(n) \times n^c$
 $\delta \circ T(n) = \theta(n)$

Dues 18.
$$T(m) = 6\tau (m/3) + m^2 \log m$$

 $a = 6$; $b = 3$
 $c = \log_5 a = \log_3 b = 1.6309$
 $m^2 = m^{1.6309}$
As $m^{1.6309} \angle m^2 \log m$
i. $T(m) = 0 (m^2 \log m)$

Ines
$$19$$
 $T(n) = 4T(n/2) + m \log n$
 $\alpha = 4$, $b = 2$, $f(n) = n/\log n$.
 $c = \log_b a = \log_2 4 = 2$
 $n^c = n^2$
 $\frac{m}{\log n}$ $\neq m^2$
 $t(n) = \theta(n^2)$

Show 20
$$T(m) = 6u + (m/8) - n^2 \log m$$
.
 $a = 6y \quad b = 8$
 $c = \log_6 6u \Rightarrow \log_8 (8)^2$
 $c = 8$.
 $m^c = m^2$.
 $m^2 \log_7 x \Rightarrow m^2$
 $T(m) = 0 (m^2 \log_7 m)$

Answer
$$21$$
 $T(m) = 7T(m/3) + m^2$

$$a = 7; b = 3; f(m) = m^2$$

$$c = \log_3 a = \log_3 7 = 1.7712$$

$$n^{c} = m^{1.7712}$$

$$m^{1.7712} < m^2.$$

$$T(m) = 0 (m^2)$$

Quarter
$$T(m) = T(m/2) + m(R - \cos m)$$

$$a = 1, b = R$$

$$c = \log_2 R = \log_2 R = 0$$

$$m^2 = m^2 = 1$$

$$m(R - \cos m) > m^2$$

$$T(m) = 0 (m(2 - \cos m))$$