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A. P. SIVALI INSHHUMEND OF THECHNOLOGY

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(Religious Jain Minority)

Subject :- ADSAA

SEM -V (I.T)

Master's Method (Master's theorem)
The recurrence relation is solved is master's theorem.
Substitution method can be used for solving any recurrence relation. but it is
But this not the case about master's method.
It can solve only recurrence a few recurrence relations which are in the format given below,
$T(n) = a T(\frac{n}{b}) + f(n)$
where $a > 1$ and $b > 1$ Also $f(n)$ must be a positive fun ⁿ
e.g. T(n) = T(n-1)+1
Here $T(n) = 1 \cdot T(n-1)+1$
\$ 50 a = 1 & b = 1
But for master's theorem the require b>1
master's method
Prof. A. N. Aher Department of Information Technology

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 3 Solution is $T(n) = gT(n) + n^2$
12/
 $T(n) = T(\frac{n}{2}) + C$
$\left(\frac{1}{2}\right)$
These 2 egrs can be solved using
These 2 egns can be solved using master's method.
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A. P. SIIVII INSHHUUHD OF THECHNOLOG

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There are 3 cases for master's theorem Case 7: If F(n) = O(n log ba - E) for constant E > 0 then $T(n) = O(n \log b^{\alpha})$ (a) grasc) For Big O notation the fun which we have is $f(n) \leq C \cdot g(n)$ we we need to show $T(n) = O(n^{\log_b a})$ we need to make both terms with as we need substract # total some constant $\exists f \ T(n) = \Omega \left(n^{\log 6\alpha} + \epsilon \right)$ Case II: for constant 6>0 then T(n)=且O(f(n)) notation the funn is $f(n) > c \cdot g(n)$ We need to show T(n) = O(f(n) we need to make both the terms as equal n3 = n1+2 we need to add some constant

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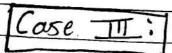
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If T(h) = O(n logba)

As both the terms are equal not \rightarrow neither \gg nor \ll in this we do not have to add or substract the constant ϵ .

T(n) = 9(n logsa) * log n

Just multiply the term with log n

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SEM -V (I.T)

Example 1 based on case 7

Give recurrence relation is

 $T(n) = 8T(h/2) + h^2$

Pattern of rerumence rel for master's method is

T(n)=aT(n|b)+f(n)a > 1, b > 1, f(n) must be the funⁿ

As the given recurrence relation is in the form of above equation let's find value for a, b &f(n)

We have a = 2, b = 2, $f(n) = n^2$

Find, n logsa = n log28

This gives us value of g(n)

 $h^{\log ba} = h^3$

(compare n² & ndogba i.e. n3

As per case I of master's theorem we have

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

n² < c. no (True

T(n) = O(n) log ba - e)

 $T(n) = \Theta(n^3)$

term amongst n3 ln2
as we need upper bound

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based on case #7

As per case I

 $f(n) \leq c \cdot g(n)$ $n < c \cdot n^2$

So find answer of Time complexity fiven recurrence relation is,

 $T(n) = \Theta(n^2)$

consider the term which is larges

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(Religious Jain Minority) Subject :- ADSAA SEM -V (I.T) Example 3 | based Solve the given recurrence relation First check if it is in the given above format we have, b=2, f(n)=nto get value of This is the value of g(h) case II of moster's theorem we have, > c. g(n) time complexity of given recurrence relation consider largest term from Prof. A. N. Aher