## Tutorial Sheet-4

Sol 1 => 
$$T(n) = 3T(n/2) + n^2$$
  
 $a = 3$   $b = 2$   $f(n) = n^2$   
o a & b are constant and  $f(n)$  is a +ve function.  
function.  
o Mester's theosem is applicable.

c= 
$$log_b a$$
  
=  $log_2 3 = 1.58$   
 $n^c = n^{lo} 58$   
which us  $n^2 > n^{l.58}$ 

or case 3 is applied here,
$$T(n) = 0 \text{ (nr)}$$

Sol2=> 
$$T(n)=4T(n_2)+n^2$$
.  
 $a=4$   $b=2$   $f(n)=n^2$   
° a and b are const. and  $f(n)$  is a +ve  
function  
on Master's theorem is applicable.

$$C = log_b a$$

$$= log_a 4 = log_2 2^2 = 2log_2 2 = 2$$

$$\Rightarrow n^c = n^2$$
which is  $n^2 = f(n)$ 

$$\therefore case & is applied here$$

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

Sol 3 => T(n) = T(2)+24 a=1, b= 2, f(n) = 2h So a & b were const. and f(n) is a +ve function c. Master's theosem is applicable  $C = \log_b a = \log_2 1$  $= n^{c} = n^{o} = 1$ ... f(n)>nc La case 3 is applied here >7(n)=0 (an) Soly > T(n) = 2" T(n)+n"  $a = 2^n b = 2 f(n) = n^n$ a is not const, its value depends on n « naster's treosen is not applicable here. Sol5=> T(n)=167(n)+n a=16 b=9 f(n)=nof a and base const., and f (n) is a tre function. " nester's theorem is applicable here.  $C = \log_6 \alpha = \log_4 (6 = \log_4 (4)^2$ = 2 log y 4=2. =) n = n2 inf(n) (nc or. Cast 2 is applied here!

T(W = O(n2)

Sol6=> T (n) = QT (n/2) + n log u a=d b= Q f(n)= n log n o, a and b are const. If (n) is a + ve function o C= log b a log22=1  $n^{c} = n$ n Inlogn =) f (n) mc ° Case 3 is applied. =) T(n) = O(nlog n).7(n) = 27(2) + n/log n a=2 b=2  $f(n)=n/\log n$ or a and b are const. and f(m is a tre function C = log 6 ce = log 2=1  $n^{c} = n' = n$ non-polynomial difference. b/w f(n) & ne ". Mester's theosem is not applicable.

Solber  $T(n) = 27(n_y) + n^{0.51}$  q = 2 b = 9  $f(n) = n^{0.52}$ o = 2 and b = 2 are const. and f(n) is a me

o'o Master's theosem is applicable. c= log, a = log, 2 = 0.50 no = no,So of fin) >nc 00 case 3 is applicable.  $T(n) = 0 (n^{\circ.5\circ}).$ T(n) = 0.9T(7)+/2. sol 9 => a = 0.5  $b = \varphi f(n) = h$ 00a<1 o° Master's theosem is not applicable T(n)=(6 T(n)+n/ Sol 10=> a=10 b=y f(n)=n/e a and b wel const. and f(n) is a the function. Master's Knewer is applicable. C = logha. = log y 16 = logy 42 = 2 logy 4= 2 nc=n2 fcn) >nc So car 3 is applied here T(n)=0(n/),

T(n)=4T (n) + Cogn. a=4 6=2 f(n)= log n or a and b are constant and f(n) is a . Master's theosem is applicable. C= log a = log 4 = log 22 = 2 log 2= 2 ne=n2

" of (m) < n c o est l'eis applied. T (n)=0 (n2).

Sol 12 => Vn T(n) + log n  $a=\sqrt{n}$ , b=0,  $f(n)=\log n$ o o a is not constant. o" Mester's theosem is not applicable

Sol B=> T(n) = 3T (z) +n a = 3 b = 2 f(m) = nof 9 & b are const & f (m) is a ful function.

" Master's theosen is applicable. c=logba=loge3=01.58.

00 f(n) < nc or case 1 is applied here.  $T(n) = O(n^{c.58}).$  $T(n) = 3T \left(n_3\right) + \sqrt{n}.$ or a and b are const. and f (n) is a tre function " master's theorem is applicable. c = log a = log 3 = 1  $n^{c} = n 1 = n$ :00 f (n) < n C ... cast 1 is appliable. T(n) = O(n)Sol 15 7 (n)=47 (2) + C.n. a=4, b= & f(n)=c. n 90° a and b alu constant and f(n) as a tre fr. « Masteris Meosem is applicable here.  $C = \log_{10} a = \log_{10} 4 = \log_{10} 2^{2} = 2 \log_{10} 2 = 2$ : f(n)< n c =) T(n) = O(n2)

 $n9 = n^{1.58}$ 

Sol16 => T(n) = 3T (n) + nlogn a=3,6=4 f(n)= nlogn o a and b are constant & f (n) is a the function. o". Mester's theosem it applicable here  $c = \log_b \alpha = \log_y 3 = 0.79$ n C=n0.79 000 f(n) >n6 o° cak 3 is applicable here. It (n) = 0 (n log n). Sol 17=7 T(n)=3T(13)+3 a=3, b=3, f(n)=4 of a lb are const. and f(n) is a surefn. o master's theosen is applicable here.  $C = log_b \alpha = log_3 3 = 1$  $n^{c}=n \leq n$   $sof(n)=n^{c}$ o case d'ais applied hou Sol 18=> T(n)=67(n) + nelog u a=6 b=3  $f(n)=n^2 (og n)$ of a b one cont. and f(n) is a tree function.

of mater's theosem is applicable here. C=logba = log36 = 1.63  $n^{c} = n^{1.63}$ % of (m)>nc - J case 3 cis applied =77 (n)= (2 (n2 Gg n) Sol 19=> T(n)= 4T(2) + 2/logn a=4, b=2, f(n)=n/lognoo a lb are const. and f(n) is a +ve . " mester's theosem is applicable here C = log 6 = log 4 = Cog 222 = 2 log 2 = 2 n=ne °°° f(n)<n2 of (n) < n0 o o cast I is applied hore 7T(n)=0(n2).

Sol 20 = T(n)= 64T (m) - n2 log n oo a and b are const. but f (n) is a -ve function .. Master's theosem is notapplicable. T(n)= 77 (n)+n2  $\alpha=7$  b=3  $f(n)=n^2$ n o a, b are eonst. I flor is a tre of Master's theosem is applied heles => C = log1 a 2 log3 7 = 1-74 nc=n1-44 os fan Ens ° Cas 3 is applied here. (m2) = 0 (m2) T(n)= (m) +n(2-cosn) o of (n) is not degular function. Sol 20=7 o Master's theoden Cannot se applied here.