

Master Theorem

1)
$$T(n) = 3T(n/2) + n^2$$

Apply master's Theorem

$$0=3$$
 $b=2$ $k=2$ $p=0$
 $0=3$ e $b^{k}=2^{2}=4$
 $b^{k} > q$

$$2$$
 $T(n) = 4T(n) + n^2$

Apply Master's Theonom
$$a=4 b=2 k=2 p=0$$

$$a=4 2 b^{k} = 2^{2}=4$$

$$q=b^{k}$$

$$A_{S} p = 0$$
 $T(n) = 0 (n^{2} | og^{2} n)$

Apply Master's Theorem
$$q=1 \quad b=2 \quad k=2 \quad p=0$$

$$q=1 \quad 2 \quad b^{k}=2^{2}=4$$

$$b^{k}>9$$

As
$$p = 0$$

 $T(n) = o(n^2)$



4]
$$T(n) = 2^n T(\frac{n}{2}) + n^n$$

Apply Master's Theorom

As a=2" which itself is a function we cannot apply master's Theorem

$$5$$
} $T(n) = 16 T(n) + n$

Apply Master's Theorom

a=16 b=4 k=1 p=0

a=16 c bk=4'=4

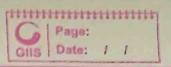
i.bk < a

As p=0 $T(n) = o(n^2)$

6)
$$T(n) = 2T(n) + n \log 2$$

Apply Mostur's Theorem a=2 b=2 k=1 p=1 a=2 $b^k=2^l=2$ $a=b^k$

 $\frac{\text{As } p=1}{T(n)=o\left(n\log^2 n\right)}$



$$\frac{1}{7}$$
 Tcn) = $2T(\frac{n}{2}) + \frac{n}{\log n}$

Apply Master's Theorem

$$a=2$$
 $b=2$ $k=1$ $p=-1$
 $a=2$ $b = 2$ $b = 2' = 2$

i. $b=a$

As
$$p = -1$$

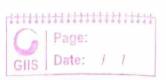
$$T(n) = 0 \quad (n \log \log n) \quad (n \log n)$$

$$T(n) = 0 \quad (n \log \log n) \quad (n \log \log n)$$

3}
$$T(n) = 2T(n) + n^{0.5i}$$

Apply Moster's Theorrom

$$a=2$$
 $b=4$ $k=0.51$ $p=0$
 $a=2$ e $b^{k}=4^{0.91}=2.0279$
 $b^{k}>9$



$$10\int T(n) = 6T(\frac{n}{3}) + n^2 \log n$$

Apply Master's Theorian

a=6 b=3 K=2 p=1

a=6 e b! =32=9

b">9

As p=1 $T(n) = o(n^2 \log n)$

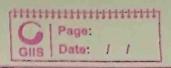
Not possible as it does not match the master's Theorem equation

12)
$$T(n) = 7T(n) + n^2$$

Apply Master's Theorem a=7 b=3 k=2 p=0 $a=7 e b^{k}=0$ As p=0

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

Apply Master's Theorem a=4 b=2 k=0 p=1 a=4 e $b^{k}=1$ \vdots $b^{k}\times a$ b=1 $T(n)=o(n^{2})$



Apply Moster's Theorem

a= 32 b=2 k=0 p=1

a= 52 e bk = 1

i. ak < a

T(n) = 0 (Jn) As p=1

15) T(n) = 2] (h) + Jh

Master's Theoriem b = 2 k = 1/2 p = 0 $a = 2 e b^k = Jz$

16/ T(n) = 3T (n) +n

Apply Maston's Meanown a=3 b=2 k=1 p>0 a=3 ebk=2 bk < aMaster's Theorian

As p=0 T(n) = (n 1525)

17)
$$T(n) = 3T(n) + 5n$$

Apply Master's Theorem

 $a=3$ $b=3$ $k=1/2$ $p=0$
 $a=3$ e $b^{k} = 3^{1/2} = 13$
 $\therefore b^{k} < a$

As $p=0$
 $T(n) = 0(n)$

Apply Master's Theorem

 $a=4$ $b=2$ $k=1$ $p=0$
 $a=4$ $b=2$ $k=1$ $p=0$
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 $\frac{Asp=1}{T(n)=o(n\log n)}$