DAA
Assignment -2

Aniket
CST -SPL-1
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(1)

$j = 1$
$j = 2$
$j = 3$
$\vdots$
$j = K$

$i = 1$
$i = 1 + 2 = 3$
$i = 3 + 3 = 1 + 2 + 3$
$\vdots$
$i = 1 + 2 + 3 + \ldots + K$

as $i < n$

sum of K consecutive integers $= \frac{K(K+1)}{2}$

$\therefore \frac{K(K+1)}{2} < n$

$\frac{K^2 + K}{2} < n$

after removing constant

$K^2 < n$

$K < \sqrt{n}$

$\therefore T(n) = O(\sqrt{n})$ Ans

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

using Master's method $T(n) = aT(n/b) + f(n)$

$a \geq 1$, $b > 1$, $C = \log_b a$

$C = \log_2 2 = 1$

$f(n) > n^c$

$T(n) = f(n))$

$O(n^2)$ A

(5) (i) (j)

1   1, 2, 3, ... n times

2   1, 3, 5, 7 ... n/2 times

3   1, 4, 7 ..... n/3 times

⋮

n   j = 1 —— 1 times

$$T(n) = n + n/2 + n/3 + n/4 + \dots + 1$$

$$= n(1 + 1/2 + 1/3 + 1/4 + \dots + 1/n)$$

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

(7) $T(n) = 2, 2^k, 2^{k^2}, 2^{k^4} \dots 2^{k \log k (\log n)}$

as we know, $2^{k \log k (\log n)} = 2^{\log n} = n$

$\therefore$ total iteration $= \log k (\log(n))$

$\therefore$ $T(n) = O(\log k(\log(n)))$ Ans

(8) (a) $100 < \log(\log n) < \log(n) < \log^2 n <$ root$(n) < n < n\log n < n^2 < 2^n < 4^n < 2^{2^n} < \log(n!) < n!$

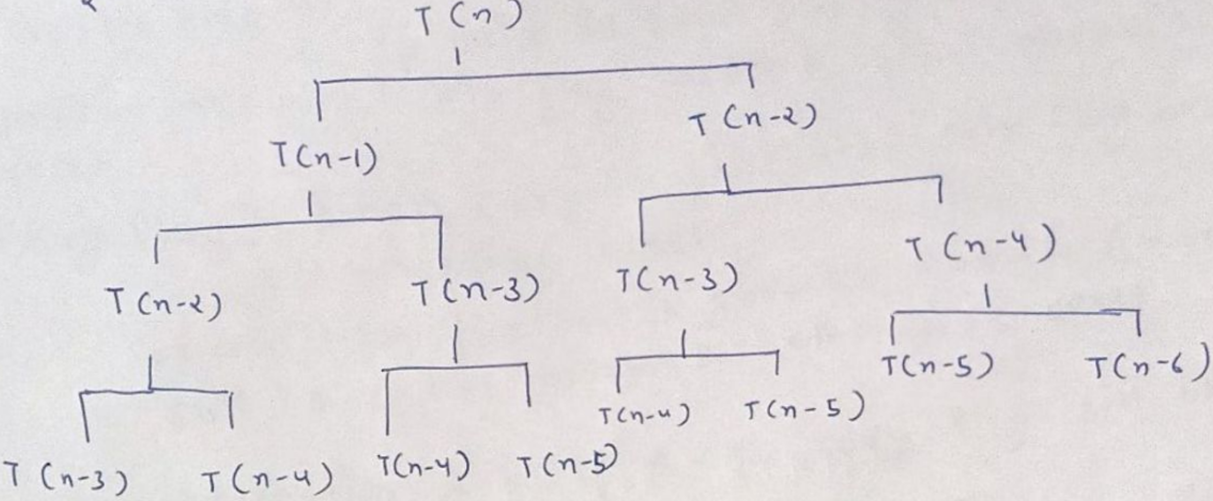
(b) $1 < \log(\log(n)) < \sqrt{\log n} < \log n < \log 2n < 2\log n < n < 2n < 4n < n\log n < n^2 < \log(n!) < n! < 2(2^n)$

(c) $96 < \log_8(n) < \log(n) < 5n < n\log_6 n < n\log_2 n < n! < \log n! < 8^{2n}$

(2) Recurrence relation of fibonacci series:

$T(n) = T(n-1) + T(n-2) + 1$

2^0



2^n

$T(n) = 2^0 + 2^1 + 2^2 + 2^3 + 2^4 + \ldots + 2^n$

now, sum of GP $= \dfrac{a(r^n - 1)}{r-1}$

$a = 1, r = 2$

$1\,\dfrac{(2^n - 1)}{1} = 2^n - 1 \quad = (2-1)$

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

Space complexity depends on the deapth of the tree

$\therefore$ Space comp $= O(n)$ Ans