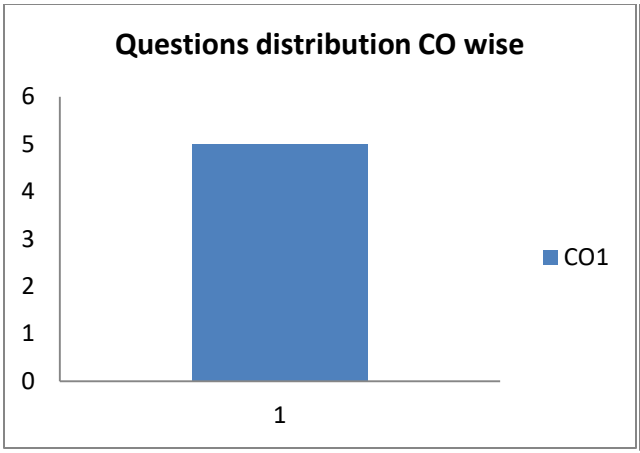
United College of Engineering and Research, Prayagraj

Department of Computer Science and Information Technology

Design and Analysis of Algorithm (KCS-503)

Assignment-1

Q. No.	Question	CO	Bloom's level
1.	Let f(n) and g(n) be asymptotically non-negative functions. Using the basic definition of,θ-notation, prove that **max (f(n), g(n)) = θ(f(n)+g(n)).**	CO1	L4
2.	Solve the followings:- (a) Is $2^{n+1} = O(2^n)$? (b) Is $2^{2n} = O(2^n)$?	CO1	L3
3.	Take the following list of functions and arrange them in ascending order of growth rate. That is, if function g(n) immediately follows function f(n) in your list, then it should be the case that f(n) is O(g(n)). $f_1(n) = n^{2.5}$, $f_2(n) = \sqrt{2^n}$, $f_3(n) = n + 10$, $f_4(n) = 10^n$, $f_5(n) = 100^n$, and $f_6(n) = n^2 \log n$	CO1	L4
4.	Rank the following by growth rate: n, 2lg √n, log n, log (logn), $\log^2 n$, (lgn)lgn, 4, $(3/2)^n$, n! .	CO1	L3
5.	How will you sort following array A of elements using heap sort: A = (23, 9, 18, 45, 5, 9, 1, 17, 6).	CO1	L3
6.	Solve the recurrence T (n) = 2T(n/2) + n2+ 2n+ 1	CO1	L3
7.	Solve the recurrence using recursion tree method: T (n) = T (n/2) + T (n/4) + T (n/8) + n	CO1	L4
8.	The recurrence T (n) = 7T (n/3) + n2 describes the running time of an algorithm A. Another competing algorithm B has a running time of S (n) = a S (n/ 9) + n2. What is the smallest value of 'a' such that A is asymptotically faster than B?	CO1	L4
9.	Solve the recurrence relation by substitution method T(n)= 2T(n/2) + n	CO1	L3
10.	Find the time complexity of the recurrence relation T(n) = n +T(n/5)+T(7n/10)	CO1	L3


Questions distribution CO wise
6
5
4
3
2
1
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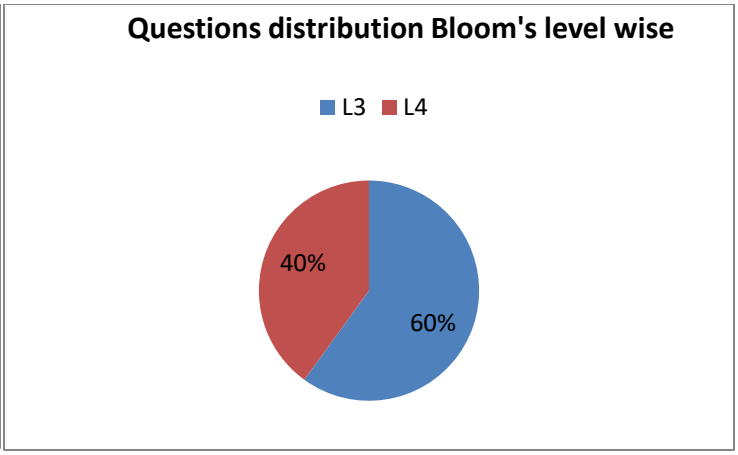
1
CO1


Questions distribution Bloom's level wise
L3
L4
40%
60%