Algorithm Design and Algorithms

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3Q Ans:>

f1(n) = $n^{2.5}$

f2(n) = sqrt(2n)

f3(n) = n + 10

f4(n) = 10^n

f5(n) = 100^n

f6(n) = > n^2 log n

f5(n)>f4(n) ➔ 100^n -→ 10^{2n} for each n>1, which is greater than 10^n i.e10^n <100^n

f1(n)>f6(n) ➔ this is because $n^{2.5}$ > n^2 and n>> logn. Hence we can conclude that $n^{2.5}$ > n^2 log n.

f2(n)<=f3(n) ➔ when we compare both the functions f2(n) ^{2} =n and f3(n)2=(n+10) ^{2} comparing upon these two functions we can conclude that sqrt(2n) is always less than or equal to n+10 i.e. sqrt(2n) <= n +10

f6(n) > f3(n) (for n>4) ➔

for n=1, f6(n)<f3(n) →n^2logn = 0 and n+10=1+10=11 i.e. n^2logn < n+10

for n=4, f6(n)<f3(n) →n^2logn = 16log4=9.63 and 4+10=14 i.e. n^2logn < n+10

for all n>4, n^2logn > n+10

f4(n)>f1(n) ➔ 10^n > $n^{2.5}$ for n> 1

Therefore, the ascending order of the functions based on their growth rate is as follows.

1) f2(n)=sqrt (2n)

2) f3(n)= n + 10

3) f6(n)=n^2 log n

4) f1(n)=$n^{2.5}$

5) f4(n)=10^n

6) f5(n)=100^n

The order of growth is f2(n) < f3(n) < f6(n) < f1(n) < f4(n) < f5(n).