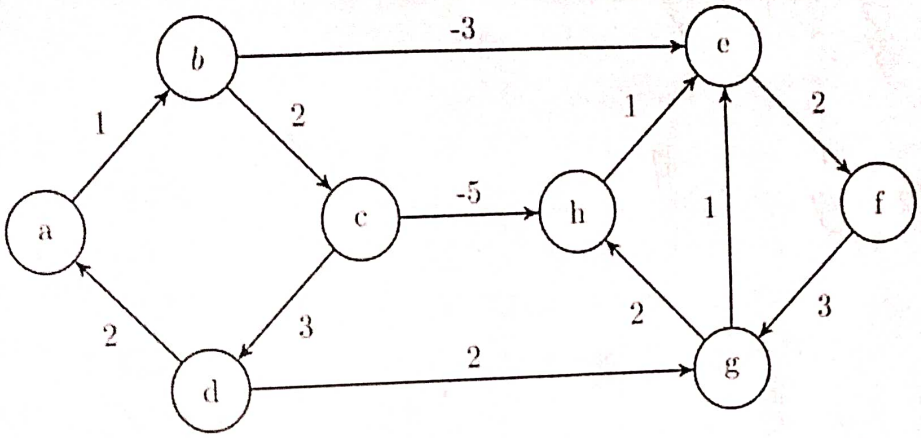
Q.61 Dijkstra's single source shortest path algorithm when run from vertex a in the above graph, computes the correct shortest path distance to **[GATE 2008]**



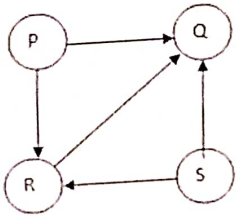
(A) only vertex a
(B) only vertices a,e,f,g,h
(C) only vertices a,b,c,d
(D) all the vertices

Q.62 Let G be a graph with n vertices and m edges. What is the tightest upper bound on the running time of Depth First Search on G, when G is represented as an adjacency matrix?

(A) $\Theta(n)$
(B) $\Theta(n+m)$
(C) $\Theta(n2)$
(D) $\Theta(m2)$

[GATE 2014]

Q.63 Consider the directed graph below given.



Which one of the following is **TRUE**?

(A) The graph does not have any topological ordering.
(B) Both PQRS and SRQP are topological orderings.
(C) Both PSRQ and SPRQ are topological orderings.
(D) PSRQ is the only topological ordering.

[GATE 2014]

Q.64 Consider the following functions from positives integers to real numbers

10, $\sqrt{n}$, n, $\log_2 n$, 100/n.

The CORRECT arrangement of the above functions in increasing order of asymptotic complexity is:

(A) $\log_2 n$, 100/n, 10, $\sqrt{n}$, n
(B) 100/n, 10, $\log_2 n$, $\sqrt{n}$, n

(C) 10, 100/n ,√n, $\log_2 n$, n
(D) 100/n, $\log_2 n$, 10 ,√n, n

[GATE 2017]

Q.65 Let n be a large integer. Which of the following statements is **TRUE**?

A. $2^{\sqrt{2\log n}} < \frac{n}{\log n} < n^{1/3}$

B. $\frac{n}{\log n} < n^{1/3} < 2^{\sqrt{2\log n}}$

C. $2^{\sqrt{2\log n}} < n^{1/3} < \frac{n}{\log n}$

D. $n^{1/3} < 2^{\sqrt{2\log n}} < \frac{n}{\log n}$

E. $\frac{n}{\log n} < 2^{\sqrt{2\log n}} < n^{1/3}$

[TIFR 2012]

Q.66 Which of the given options provides the increasing order of asymptotic complexity of functions f1, f2, f3, and f4?

f1(n) = 2^n

f2(n) = n^3/2

f3(n) = nlogn

f4(n) = n^logn

(A) f3, f2, f4, f1

(B) f3, f2, f1, f4

(C) f2, f3, f1, f4

(D) f2, f3, f4, f1

[GATE 2011]

Q.67 Consider the following functions

f1=$n^{\log n}$, f2=$n^{0.23}$, f3=n log log n ,f4 = $2^{\log n}$,f5=2^n ,f6=3^n

Choose the correct statement which ranks the functions by order of growth

(A) f3<f2<f4<f1<f5<f6

(B) f2<f4<f3<<f1<f5=f6

(C) f2<f4<f3<f1<f5<f6

(D) None of these.

Q.68 If there are N numbers 1,2,3,.....N and we remove all numbers at odd positions i.e. numbers at position 1,3,5,7..... then we left with 2,4,6,8,10,..... Again we remove numbers at odd position i.e. 2,6,10,..... then we left with 4,8,12,..... .If we continue this process then which is the last remaining number :

(A) ceil($\log_2$ N)

(B) floor ($\log_2$ N)

(C) N

(D) None of these

(68) N = 1 → last = 1

N = 1, 2 ⇒ 2

N = 1, 2, 3 ⇒ 2

N = 1, 2, 3, 4 ⇒ 4

N = 1, 2, 3, 4, 5, 6, 7, 8, 9 ⇒ 8

N → even last ⇒ N

N → odd last ⇒ N-1

Q.69 Which one of the following is the recurrence equation for the worst case time complexity of the Quick sort algorithm for sorting $n(\geq 2)$ numbers? In the recurrence equations given in the options below, c is a constant.

(A) $T(n) = 2T(n/2) + cn$

(B) $T(n) = T(n-1) + T(0) + cn$

(C) $T(n) = 2T(n-2) + cn$

(B) $T(n) = T(n/2) + cn$

[GATE 2015]

Q.70 Let P be a Quicksort Program to sort numbers in ascending order using the first element as pivot. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and {4, 1, 5, 3, 2} respectively. Which one of the following holds?

(A) t1 = 5 (B) t1 < t2 (C) t1 > t2 (D) t1 = t2

[GATE 2002]

Q.71 Let P be a Quicksort Program to sort numbers in ascending order using the first element as pivot. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and { 5,4, 3, 2,1} respectively. Which one of the following holds?

(A) t1 = 5 (B) t1 < t2 (C) t1 > t2 (D) t1 = t2

[GATE 2014]

Q.72

Consider the equality $\sum_{i=0}^{n} i^3 = X$ and the following choices for X:

I. $\Theta(n^4)$

II. $\Theta(n^5)$

III. $O(n^5)$

IV. $\Omega(n^3)$

The equality above remains correct if X is replaced with :

(A) Only 1 (B) Only 2

(C) For III or IV but not II (D) II or III or IV but not I

[GATE 2015]

Q.73 Let f(n)=n and g(n)=n(1+sin n), where n is a positive integer. Which of the following statements is/are correct?

I. f(n) = O(g(n))

II. f(n) = Ω(g(n))

(A) Only (B) Only II

(C) Both I and II (D) Neither I nor II

[GATE 2015]

Q.74 Which one of the following correctly determines the solution of the recurrence relation with T(1) = 1?

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

(A) Θ(n)

(B) Theta(nlogn)

(C) Theta(n^2)

(D) Theta(logn)

[GATE 2014]