RAJ KUMAR GOEL INSTITUTE OF TECHNOLOGY & MANAGEMENT, GZB

1st Sessional Examination 2017-18 (Odd Semester)

Roll No.: **Subject Name: Design & Analysis of Algorithms**

Year/Branch: 3RD yr/(CS+IT) **Subject Code: NCS-603**

Max Time: 1Hours 30 Minute **Max Marks: 50**

SECTION-A

Q.1 Attempt all parts carry equal marks. Write answer of each part in short. (2x5=10)

(a) Why should we do asymptotic analysis of algorithms? Explain.

(b) Find ɵ notaion for the function $f(n)= 27n^2+16n+25$.

(c) Arrange the following growth rates in increasing order:

$O(n^4)$, $O(nlogn)$, $O(2^n)$, $\Phi(n^2logn)$, $\Phi(n^{2.5})$

(d) What are HEAPS ? Describe all its type with suitable example.

(e) Find the Big-oh (O) notation for the following function

(i) $f(n)= n^4+34logn$

(ii) $f(n)= 2^n+n^3-79$

SECTION-B

Note: Attempt any five questions from this section. (5x5=25)

Q.2 Solve the following recurrence $T(n)=T(n/3)+n^{4/3}$.

Q.3 find an optimal solution for the fractional knapsack instances for n= 5, (w1,w2,w3,w4,w5) = (5,4,6,2,1) and (P1, P2, P3,P4,P5) = (5,2 ,2,4,5) for M=12.find optimal solution.

Q.4 Illustrate the operation of HEAP-SORT on the array A=<5,13,2,25,7,17,20>

Q.5 Use a recursion tree to give an asymptotically tight solution to the following recurrence

$T(n) = T(\alpha n)+T((1-\alpha)n)+cn$ where c & α is a constant in the range $0<\alpha<1$.

Q.6 Discuss the algorithm of PARTITION. Apply it on the array <4,5,1,7,8,9,2,3>

Q.7 Discuss the algorithm of COUNTING-SORT**.**

Q.8 Apply Merge sort to sort the keys as 12,13,10,5,7,3,2.

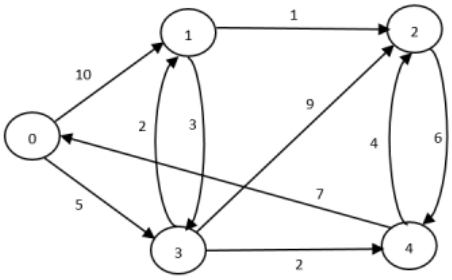
Q.9 Write down the pseudo code for Kruskal algorithm.

SECTION-C

Note: Attempt any two questions from this section. (7.5x2=15)

Q.10 Compare & Contrast Greedy approach with Dynamic programming and apply it on Knapsack problem.

Q.11 Discuss the Dijkstra Algorithm and Apply it on the following given graph.



Q.12 Explain and write an algorithm for Prim's. Also solve following problem.