**B.TECH. SEM -VI ( COMPUTER) 2014 COURSE (CBCS) :**

**WINTER - 2017**

**SUBJECT: DESIGN AND ANALYSIS OF ALGORITHMS**

Day : **Tuesday** Time: **10.00 AM TO 01.00 PM**

Date : **21/11/2017** Max. Marks. 60

**W-2017-2194**

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**N.B.:**

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if **NECESSARY**.

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**Q.1** Prove that if $f(n)=a_m n^m+\ldots\ldots+a_1 n+a_0$ then $f(n)=O(n^m)$ **(10)**

**OR**

Write a recursive Algorithm for computing Ackermann's function A(m,n)

$$A(m,n)=\begin{cases} n+1 & if\ m=0 \\ A(m-1,1) & if\ n=0 \\ A(m-1,A(m,n-1) & otherwise \end{cases}$$

**Q.2** Prove that the binary tree of depth 'k' has exactly $2^k$-1 nodes. What is such type of tree called? **(10)**

**OR**

For the following list of elements show the traces of successful search for x=151 and unsuccessful search for x = -14.
{-5, -6, 0, 7, 9, 23, 54, 82, 101, 112, 125, 131,142, 151}

**Q.3** Give the Strassen's matrix multiplication method to multiply two matrices. **(10)**

**OR**

Show how Quicksort, sorts the following sequences of keys 1, 1, 1, 1, 1, 1, 1 and 5, 5, 8, 3, 4, 3, 2.

**Q.4** Consider the following instance of the Knapsack problem **(10)**
n=3, m=20, $(p_1, p_2, p_3)$=(25, 34, 15) and $(w_1, w_2, w_3)$= (18, 15, 10). Find all the feasible solution and indicate the Optimal solution out of them.

**OR**

Describe the Tree Vertex Splitting Algorithm with suitable example.

**Q.5** Consider an instance n=6, m=30 and w[1 : 6]={5, 10, 12, 13, 15, 18}. Show the state – space tree using Sum of Subsets Algorithm. **(10)**

**OR**

Describe FIFO Branch and Bound Algorithm.

**Q.6** Let L=10, n=6, and $(l_1, l_2, l_3, l_4, l_5, l_6)$ = (5, 6, 3, 1, 2, 4) show the packing of these objects using Bin Packing Algorithm. **(10)**

**OR**

Explain Clique Decision Problem(CDP)

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