BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE
BRANCH: CSE

SEMESTER : III
SESSION : MO/16

SUBJECT: CS6101-DESIGN AND ANALYSIS OF COMPUTER ALGORITHM

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The total value of the questions are 30 marks.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtain exceed 25 marks. The excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1. (a) List two approaches for Randomized algorithm. [2]
(b) Show that $(\lg n!) = \Theta(n \lg n)$ [3]

Q2. (a) Can there be an algorithm which does not take any input? Justify. [2]
(b) Solve the recurrence $T(n) = 3T(n/4) + n$ [3]

Q3. (a) Suppose that we have numbers between 1 and 1000 in a BST, and we want to search for the number 363. Which of the following sequences of could not be the sequence of nodes examined? [2]
   a. 2,252,401,398,330,344,397,363.
   b. 925,202,911,240,912,245,363.
(b) Derive the best case time complexity of Quicksort. [3]

Q4. (a) Write the recurrence relation for Strassen's matrix multiplication and solve this recurrence. [2]
(b) Let A[1...n] be an array of n distinct numbers. If i<j and A[i] > A[j], then the pair (i,j) is called an inversion of A. List all the inversions of the array <2,3,8,6,1,7> [3]

Q5. (a) Find a feasible solution for the following list of jobs, also find the sequence and find the profit earned. Assume all pre-defined conditions for Job sequencing with deadlines. [2]

Job	I	II	III	IV	V
Profit	100	35	20	15	50
Deadline	2	1	3	2	4

(b) Find the time optimal code pattern for the following set of alphabets and their frequency. [3]

a	b	c	d	e	f	g	h	i
22	1	2	4	23	7	6	9	11

Q6. (a) If f(n) is a polynomial equation of degree n then prove that $f(n)=\Theta(n^2)$. [2]

(b) Explain the time complexity of finding minimum cost spanning tree using KRUSHKAL's algorithm. [3]

*****20.09.16*****E