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

CLASS: BE
BRANCH: CSE

SEMESTER: III
SESSION : MO/2017

SUBJECT : CS6101-DESIGN AND ANALYSIS OF COMPUTER ALGORITHM

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained 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) Prove that $n! = O(n^n)$ [2]
(b) Solve the recurrence $T(n) = 3T(n/4) + n^2$. [3]

Q2 (a) What is randomized algorithm? Classify it. [2]
(b) Give an algorithm that determines the number of inversions in any permutation on n elements in $\Theta(n \lg n)$ worst case time. [3]

Q3 (a) Proposed a strategy for pivot selection in quicksort and justify your answer. [2]
(b) In an algorithm suppose a line representing $k=(i+j)/2$ replace with $k=j-2$. Is the resulting algorithm still correcting? Justify your answer. [3]

Q4 (a) Is it always a recursive function needed in the design of divide and conquer approach? Justify. [2]
(b) Derive the worst-case time complexity of quicksort algorithm. [3]

Q5 (a) Find the optimal binary merge pattern for the ten files whose lengths are [28,32,12,5,84,53,91,35,3 and 11]. [2]
(b) Write an algorithm for the above problem and analyze its time complexity. [3]

Q6 (a) Find the optimal sequence for the jobs whose data are given as follows. [2]

Job	1	2	3	4	5	6	7
Deadline	4	2	4	3	1	4	6
Profit	70	60	50	40	30	20	10

(b) Write an algorithm for finding Minimum spanning tree and analyze its time complexity. [3]

*****20-09-17*****E