

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/ Backlog), April-May 2018
B. Tech/ M. Tech (as applicable) in Engineering, Semester

Roll No.....

COURSE CODE: CSE405

COURSE TITLE: Design & Analysis of Algorithm

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Breadth first search requires which of the following?
a) Stack b) Queue c) Both d) None of the above.
- ii. If $f(n)=3\log(n)+7n+3$, then $f(n)$ is
a) $O(n)$
b) $O(\log(n))$
c) $\Omega(1)$
d) All of the above
- iii. The ____ notation is used when the lower bound of a polynomial is to be found.
a) Big Oh b) Small Oh c) Theta d) Omega
- iv. Which is not an essential characteristics of algorithm?
a) Definiteness
b) Finiteness
c) Efficiency
d) Effectiveness
- v. Which of the following is a method to solve recursive equation?
a) Tree Method
b) Substitution Method
c) Master Theorem
d) All of the above.
- vi. Let S be an NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is true?
(a) R is NP-complete (c) Q is NP-complete
(b) R is NP-hard (d) Q is NP-hard
- vii. In a depth-first traversal of a graph G with n vertices, k edges are marked as tree edges. The number of connected components in G is
(a) k (c) k+1
(b) n-k+1 (d) n-k

- viii Given two vertices in a graph s and t , which of the two traversals (BFS and DFS) can be used to find if there is path from s to t ?
- Only BFS
 - Only DFS
 - Both BFS and DFS
 - Neither BFS nor DFS
- ix Which of the following algorithms can be used to most efficiently determine the presence of a cycle in a given graph?
- Depth First Search
 - Breadth First Search
 - Kruskal Minimum Spanning Tree Algorithm
 - Prim's Minimum Spanning Tree Algorithm
- x Which of the following condition is sufficient to detect cycle in a directed graph?
- There is an edge from currently being visited node to an already visited node.
 - There is an edge from currently being visited node to an ancestor of currently visited node in DFS forest.
 - Every node is seen twice in DFS.
 - None of the above

- Q.2 Short answer type questions (4 questions @ 2.5 marks) 10
- Define an algorithm. Describe the characteristics of the algorithm.
 - What do you mean by input size of problem? Explain its significance.
 - What is difference between time and space complexity?
 - Define master theorem.
- Q.3A Describe the sequence of steps involved in the designing of a greedy algorithm. 05
- Q.3B Compare and contrast divide and conquer approach and greedy approach? 05
- Q.4A Write the Quick sort algorithm? Analyze the time complexity in worst case? 05
- Q.4B Show that $f(n)+g(n)=O(n^2)$ where $f(n) = 3n^2 - n + 4$ and $g(n)=n\log n+5$. 05
- Q.5A Explain the asymptotic notations used in algorithm analysis and also explain with the suitable example best case, worst case and average case of an algorithm. 05
- Q.5B Explain with an example how a graph can be transformed into a bi connected graph? 05
- Q.6A Sort the following elements using quick sort? 12, 24, 8, 67, 34, 21, 78. Explain proper steps for the same. 05
- Q.6B Define Knapsack problem. Which strategy is used to solve Knapsack problem. 05
- OR
- Q.6B Differentiate between NP and NP-Hard problem. 05

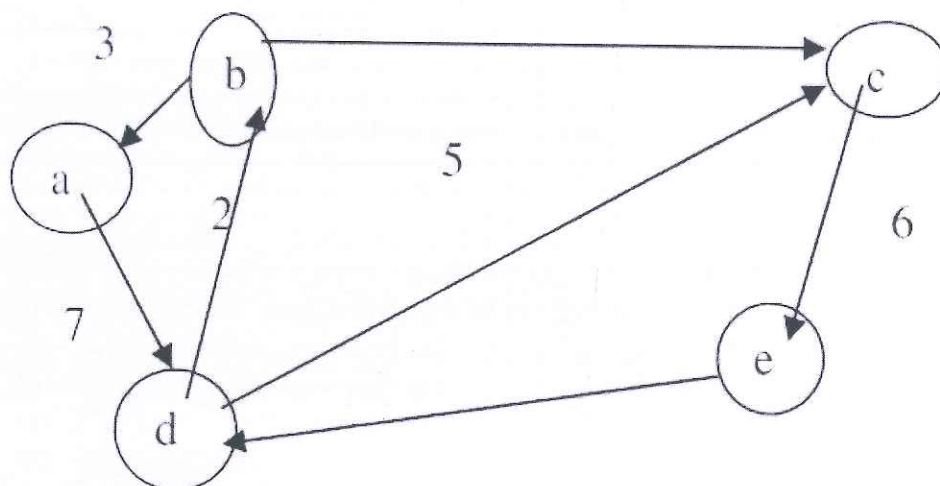
Q.7A Does an N Queens problem with 3X 3 board have a solution? How many solutions are there for the 8 queens problem? 05

Q.7B Using Backtracking enumerate how can you solve the problem of Hamiltonian circuit problem. 05

OR

Q.7B Define merging and purging rules of 0/1 Knapsack problem. 05

Q.8A Solve the following instance of the single source shortest path problem with vertex 'a' as the source. 15



Q.9 Explain how to solve travelling salesman problem by the method of dynamic programming and analyse complexity of the algorithm. 15

OR

Q.9 Solve the all-pairs shortest path problem for the digraph with the weight matrix given below :- 15

	A	B	C	D
A	0	∞	∞	3
B	2	0	∞	∞
C	∞	7	0	1
D	6	∞	∞	0