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Total No. of Pages : 02

Total No. of Questions : 08

**BCA / DEP (Sem.-3)**  
**DATA STRUCTURES**  
**Subject Code : BSBC-302**  
**M.Code : 10058**  
**Date of Examination : 09-07-21**

Time : 2 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. **Attempt any FIVE question(s), each question carries 12 marks.**
  
1. *'Big O Notation helps in analyzing performance of an algorithm'*. Justify this statement. Write an algorithm to find factorial of a prime number. Derive its time and space complexity. What is difference in different cases of time complexity?
  
2. ABC Ltd is a company in network management. Company has designed a structured network of computers and routers and has represented it in a tree structure. What are the possible ways to traverse across company network structure? If all devices in network have been labelled as [65, 24, 56, 8, 6, 12, 64, 41] present them in different binary tree representations.
  
3. When you delete a variable, do you actually delete the variable or just reference to that variable? What happens to the variable with deleted reference? How can you manage deleted heap of unreferenced variables in the memory. Explain in detail. Can linked list help in it? If yes, justify your reasons.
  
4. Why do Bubble sort algorithm is preferred over other techniques of sorting? Write down different steps of bubble sort and sort [12, 68, 46, 35, 78, 15, 65, 45, 32, 78, 12, 69, 49, 58] step by step while elaborating the algorithm. Write down any two suggestions to improve worst case complexity of bubble sort algorithm.
  
5. How dynamic memory management may help in saving memory space? Explain. Draw and elaborate a doubly linked list. What are the different possible cases for inserting a new node in the double linked list?
  
6. Where can you use stack in computer system? How can you convert infix notations to postfix notations by using Stack properties? Elaborate by converting  $a+s/t*j+(w-v)$  to postfix expression step by step.

7. What are cases when selection sort will be preferred over other sorting techniques? Write down its different steps and sort a sample array by taking your own example. Write down time and space complexity of selection sort for all cases.
8. Different processes are requesting for the same resource through operating system. Which data structure may be used for managing resource allocation by operating system? Write and illustrate different possible operations on this data structure.

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