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IIIRD SEMESTER

MID SEMESTER EXAMINATION

Roll No.....

B.Tech.-(Computer Engg.)

(Sept. – 2019)

Paper Code: COE-201

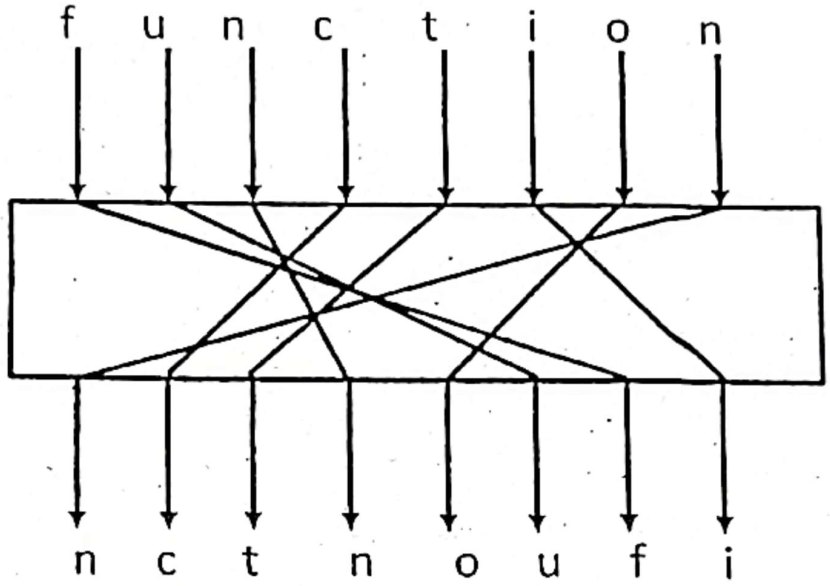
Title of the subject: Data Structures

Time: 1:30 Hours

Max. Marks: 30

Note: Answer all questions.
Assume suitable missing data, if any.

1. Consider following diagram to rearrange characters of 8-char array (e.g. string



"function" is converted to string "nctnoufi".

(a) Design a suitable data structure (say 'X') and write function to perform this conversion.

(b) Write a function to find inverse of data structure 'X' such that string "nctnoufi" is converted back to "function" using this new structure.

(4+4=8 marks)

2. There is a singly linked list containing data sorted in non-decreasing order. There are two elements in this linked list which store similar data values. Write an algorithm to delete first node (out of two-containing equal values) which contains duplicate data value.

(5 marks)

3. Write an algorithm for returning value stored in k^{th} node (from end) of the singly linked list.

(5 marks)

4. Use a stack to test for balanced parentheses, when scanning the following expressions. Only consider the parentheses [,],(,),{,} . Ignore the variables and operators. Example inputs (valid balanced) are:
   (a) [a + { b / (c - d) + e / (f + g) } - h]
   (b) [a { b + [c (d + e) - f] + g }
   Write algorithm to test if given input string contains balanced parentheses.

(6 marks)

5. Let S be a stack of size n ≥ 1. Starting with the empty stack, suppose we push the first n natural numbers in sequence, and then perform n pop operations. Assume that Push and pop operation take X seconds each, and Y seconds elapse between the end of one such stack operation and the start of the next operation.
   (a) For m ≥ 1, define the stack-life of m as the time elapsed from the end of Push(m) to the start of the pop operation that removes m from S.
   (b) Compute the average stack-life of an element of this stack.

(6 marks)