

16047(D) 0 DEC 2016

B. Tech 3rd Semester Examination

Data Structures and Algorithms (NS)

CS(IT)-211

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt any five questions in all, selecting one question from each sections A, B, C and D. Section E is compulsory.

SECTION - A

1. (a) Find the Big Omega (Ω) notation for the following:

- (i) $f(n) = 27$
- (ii) $f(n) = 13n + 40$
- (iii) $f(n) = n^2 + n$
- (iv) $f(n) = n^3 + 16n + 4$
- (v) $f(n) = 2n + 3n^3 + 14$

- (b) Prove that the following are incorrect Bounds.

- (i) $7n^3 + n \neq O(n^2)$
- (ii) $7n^3 + n^2 \neq \Omega(n^4)$
- (iii) $7n + 3 \neq O(1)$
- (iv) $7n + 3 \neq \Theta(n^2)$
- (v) $7n + 3 \neq \Theta(n^4)$ (20)

2. (a) Using a stack write a program that reads a text file, one line at a time and prints the line as it was read and then prints the line with its text reversed. Print a blank line after each reversed line.

- (b) Write the pseudo code for an algorithm that reverses the contents of a stack. (20)

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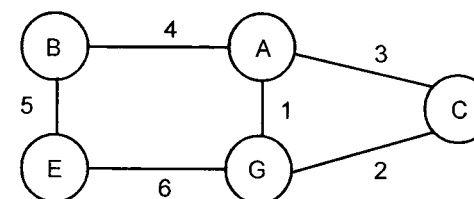
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SECTION - B

3. (a) Write an algorithm that counts the number of nodes in a binary tree.
- (b) Write an algorithm to delete all leaves from a binary tree, leaving the root and intermediate nodes in place. (20)
4. (a) Write an algorithm for post order traversal.
- (b) Write an algorithm that prints an AVL tree. (20)

SECTION - C

5. (a) Write an algorithm that prints minimum spanning tree of a graph.
- (b) Write an algorithm that determines whether a node is disjoint. (20)
6. Write an algorithm for depth first traversal for graph. Show execution with an example shown in figure. (20)



SECTION - D

7. Write an algorithm for heap sort. What would be the value of the elements in the array after three passes of heap sort for following data? (20)
- 78 26 44 13 23 98 57
8. Perform complexity analysis for (20)
- (a) insertion sort (b) Radix sort

SECTION - E

9. (a) Write an algorithm for insertion and selection in doubly ended queue.
- (b) Write an algorithm for insert and delete in heap. (20)