

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 ( $\Omega$ ) 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.

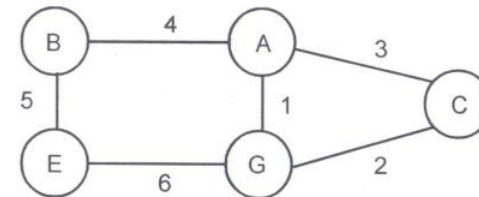
(b) Write the pseudo code for an algorithm that reverses the contents of a stack. (20)

**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)