

Total No. of printed pages = 4

CS 131305

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Roll No. of candidate

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SCANNED

2017

2017

B.Tech. 3rd Semester End-Term Examination

Computer Science Engineering

DATA STRUCTURE AND ALGORITHMS

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No.1 and any six questions
from the rest.

(10 × 1 = 10)

1. (a) What do you mean by an Algorithm?
- (b) _____ is FIFO data structure?
- (c) What is ADT?
- (d) Explain about the term time space trade off.
- (e) If $f(n) = 2^{n+1}$ then what is Big Oh notation?
- (f) If $f(n) = n^2 + 50n$ what is Omega Notation?
- (g) For an array declared as `int arr [50]`, calculate the address of `arr[35]` if the Base address is 1000.

[Turn over

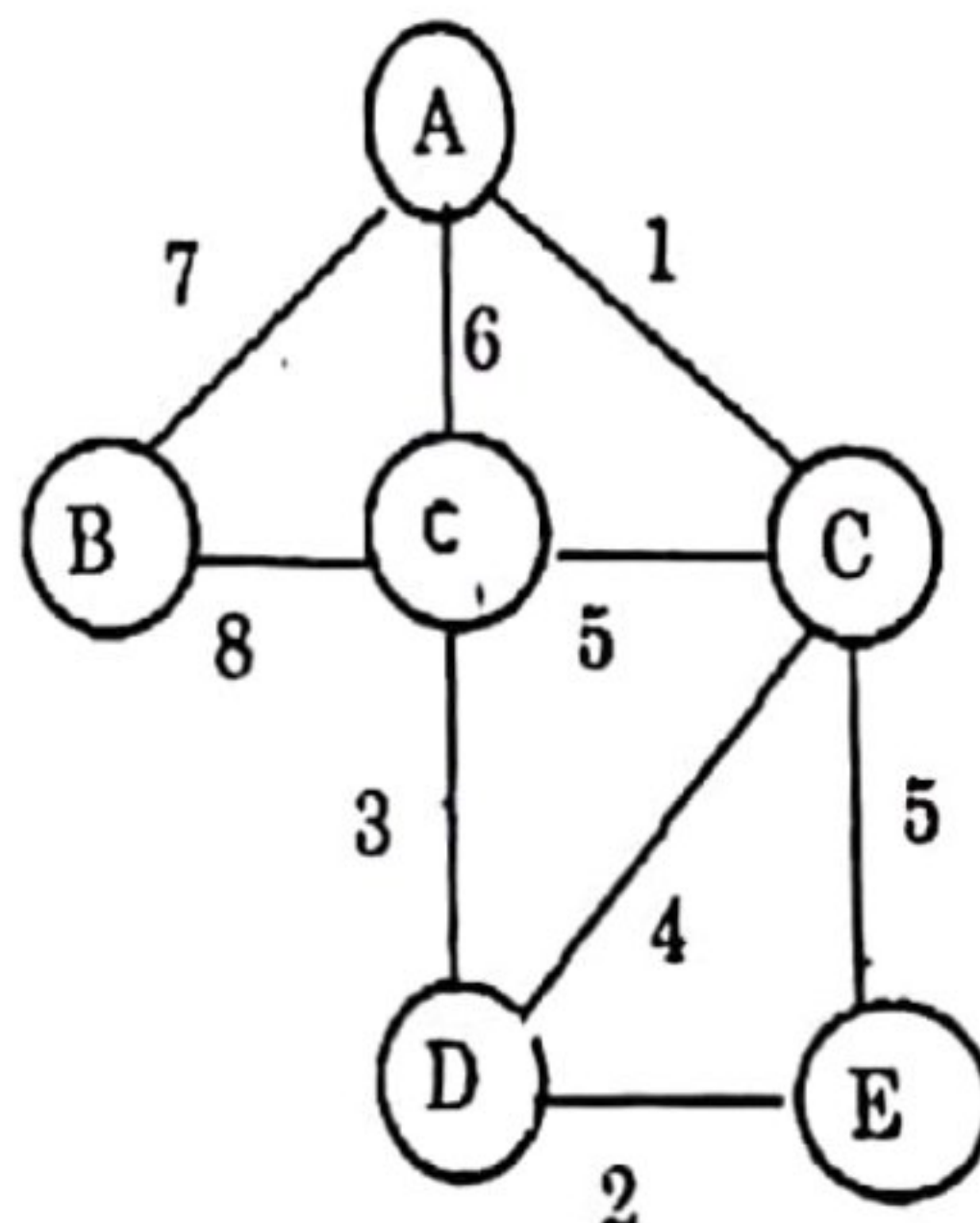
- (h) What is the recurrence relation of tower of Hanoi Problem?
- (i) Draw the binary Expression tree that represent the following postfix expression $A B + C * D -$
- (j) What is the maximum number of nodes that can be found in a binary tree at levels 3?
2. (a) Explain the four good characteristics of an algorithm. (4)
- (b) Write an algorithm for finding the sum of n natural numbers and then express its complexity in terms of big Oh, Big Omega and theta notation. (3 + 3)
- (c) Explain about the sparse matrices and its application. (5)
3. (a) Write an algorithm to insert one element after a given node of a link list. (5)
- (b) Consider the queue given below which has FRONT=1 and REAR=5. (6)

	A	B	C	D	E				
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Now perform the following operation on the queue.

- (i) ADD F
- (ii) Delete Two Letters
- (iii) ADD G
- (iv) ADD H
- (v) Delete Four Letters
- (vi) ADD I.

- (c) Convert the following infix expression to Postfix expression. (4)
- (i) $A*B+C/D+E*F$
- (ii) $14/7*3-4+9/2$
4. (a) Explain about four queens Problem with the help of a diagram. (4)
- (b) Insert the following in a BST
 $L = \{2, 6, 7, 8, 3, 4, 5, 1, 9, 12, 14, 15\}$. (4)
- (c) How an AVL tree is better than a Binary Search Tree. (3)
- (d) How many nodes will a complete binary tree with 27 nodes have in the last level? What will be the height of the tree? (2 + 2)
5. (a) Apply kruskals algorithm to find the MST for the following graphs. (6)



- (c) Can we implement binary search for the following numbers $L = \{3, 1, 4, 5, 2, 9, 7, 8, 6\}$ If not then why? If yes, then implement BS (indirectly) for the element which is present in position $L[3]$. Start the position from $L[0]$. (5)
6. (a) Write an algorithm for merge sort and also apply it for the followings elements $L = \{2, 4, 1, 5, 3, 9, 6, 7, 8, 8\}$. (10)
- (b) Explain the term big Oh, Big Omega and theta notation. (5)
7. (a) Build a MAX heap H from the given set of numbers : 45, 36, 54, 27, 63, 72, 61, and 18. Also Draw the memory representation for it. Also Perform HEAPSORT from it. (10)
- (b) Explain DFS with the help of an Example. (5)
8. (a) Build a Construct a B tree of order 3 and 4 with the following keys $L = \{24, 12, 21, 3, 18, 67, 44, 87, 47, 54, 56, 17, 8, 30, 45, 5, 7\}$. After Constructing the B tree ,delete the following nodes 18, 67, 54, 8, 45 and 5 from it. (10)
- (b) Explain BFS with the help of an Example. (5)
9. (a) Explain about Radix sort with an example. (5)
- (b) Explain about the Prim Algorithm with an example. (10)
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