

**BACHELOR IN COMPUTER
APPLICATIONS****Term-End Examination****December, 2007****CS-62 : 'C' PROGRAMMING AND DATA
STRUCTURE***Time : 2 hours**Maximum Marks : 60*

Note : Question no. 1 is **compulsory**. Answer any **three** questions from the rest. All algorithms should be written nearer to 'C' language.

1. (a) Define an AVL tree. Construct a height balanced tree for the following list of elements : 8
4, 6, 12, 8, 4, 2, 15, 7, 3
- (b) Write an algorithm to implement linked list using pointers and perform the following tasks : 10
- (i) Delete a node in the list, given a pointer to that node.
- (ii) Write a function to reverse the linked list.

- (c) Write an algorithm that reads $m \times n$ matrix "A" and $p \times q$ matrix "B", checks whether these matrices are multipliable in either order or not. (e.g. whether $A \times B$ or $B \times A$ is defined). Further, if $A \times B$ or $B \times A$ is defined then calculate the product.

Note : Show proper error handling also.

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- (d) Calculate the time complexity of the following code by using Big 'O' notation :

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1. Scanf ("%d", &n);
2. Scanf ("%d", &m);
3. for (i=0; i<=m+n; i+=2)
4. Printf ("%d \n", i-1);
5. for (j=m*n/100; j<=m*n; j++)
6. Printf ("%d \n", j);

2. (a) Write an algorithm, that accepts 12 words of different string-size. Arrange the words in descending order based on the sum of ASCII values of the characters in the string.

e.g. : If string is "ABFD", its ASCII mapping is 65, 66, 70, 68 respectively and sum is

$$65 + 66 + 70 + 68 = 269$$

Hint : ASCII value of 'A' starts with 65, and 'a' starts with 97.

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- (b) Write an algorithm to implement bubble sort technique. Also, show the steps of bubble sort on the following given number :

"5, 12, 38, 7, 3, 18, 68, 115"

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3. (a) Construct the binary tree using the following preorder and inorder sequences :

Preorder : A B C E I F J D G H K L

Inorder : E I C F J B G D K H L A

Also, write the postorder sequence of it.

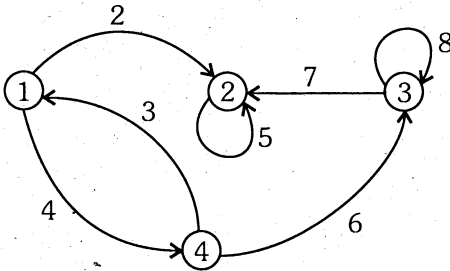
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- (b) Write algorithms to perform the following operations in circular queue :

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- (i) Create a circular queue
- (ii) Check whether a queue is empty
- (iii) Insert an element in a queue

4. (a) Consider the following graph :



Make the adjacency matrix for the given graph. Also, write an algorithm to compute the transpose of the matrix.

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- (b) What is a sparse matrix ? Which method is used to represent its non-zero elements ? Also, write the algorithm corresponding to this method, explaining its steps.

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5. Explain the following with an example of each :

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- (a) Direct file organisation
- (b) Depth first search
- (c) B-tree
- (d) Column major order