Dr. Poota Shaqma Df: 9/12/22 CSE

Roll No.....

Max. Marks: 50

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National Institute of Technology, Hamirpur **BTech & Dual Degree (ECE)** CS-201, Data Structures **End Semester Examination, December- 2022 Total Pages-2**

Duration: 3:00 Hours

Note: Attempt all the questions. Be brief and to the points in writing answers. Assume suitable data if necessary. Preferably, write the answers in sequential order

1. Write the output of the following C program. Also explain its logic.

```
#include <stdio.h>
int main () {
  int a [4] [5] = \{\{1,2,3,4,5\},\
                 {15,14,13,12,11},
                 {10,9,8,7,6},
                 \{5,4,3,2,1\}\};
         printf ("%d\n", *(*(a+**a+2) +3));
```

2. Let A be a two-dimensional array declared as follows: A: array [1...10] [1...15] of integer; Assuming that each integer takes one memory locations the array is stored in row-major order and the first element of the array is stored at location 100, what is the address of the element A[i] [j]? (2)

}

3. What is the output of the program for the following input? Explain with logic. 52*332+*+

> # include <stdio.h> # define EOF - 1 void push (int); /* push the argument on the stack */ int pop (void); /* pop the top of the stack*/ void flag Error(); int main () $\{$ int c, m, n, r; while ((c = getchar())! = EOF){ if (isdigit (c)) else if ((c = = '+') | | (c = = '*'))push(c);{ $m = pop(); n = pop(); r = (c = +) n + m : n^*m; push(r); }$ else if (c! = '')flag Error (); } printf("%c", pop()); }

- 4. Compute the post fix equivalent of the following expression. $3 * \log(x+1) - a/2$
- 5. Consider the following sequence of operations on an empty queue. enqueue (21); enqueue (24); dequeue (); enqueue (28); enqueue (32); q = dequeue (); Consider the following sequence of operations on an empty stack.

1

push (54); push (52); pop (); push (55); push (62); s = pop (); Calculate the values for q, s and q+s.

6. Consider the following directed graph. Calculate the numbers of different topological orderings of the vertices of the graph. Write all orders. (3)



- 7. Suppose G be a connected undirected graph of 200 vertices and 400 edges. The weight of a minimum spanning tree of G is 1000. The weight of each edge of G is increased by 10. Calculate the weight of a minimum spanning tree. (3)
- 8. Draw AVL tree that results after each of the integer keys 9, 27, 50, 15, 2, 21, and 36 are inserted, in that order, into an initially empty AVL tree. Clearly show the tree that results after each insertion, and make clear any rotations that must be performed. (5)
- Describe briefly the selection sort. Show different passes required to perform selection 9. sort on the following list of numbers:

76, 32, 43, 10, 87, 21, 65, 54

Also show the worst and average case complexities.

(6)

- 10. Suppose you are given a table T of size 11 and a set $S = \{5, 40, 18, 22, 16, 30, 27\}$ to hash into the table, using the hash function h(k) = k% 11.
 - a. Show T after the values from S are entered into it, using separate chaining.
 - b. Show T after the values from S are entered into it, using linear probing with the function h(k,i) = (h(k)+2i)%11(6)
 - c. For this particular T and S, which is the better choice, and why?

11. Write short notes on the following:

- a. Radix Sort
- b. Abstract Data Type
- c. Dequeue
- d. Breath First Search and Depth First Search
- 12. Discuss the advantages of two-way list over one way list for each of the following operations:
 - a. Traversing the list to process each node.
 - **b.** Deleting a node whose location LOC is given.
 - c. Searching an unsorted list for a given element ITEM.
 - d. Searching a sorted list for a given element ITEM.
 - Inserting a node before the node with the given location LOC. e.

(3)

(8)

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