

Branch : Computer Science

Subject : Data Structure

DPP-03

Topic : Stack and Queue

1. The result evaluating the postfix expression:

6 2 3 + - 3 8 2 / + × 2 ^ 3 + [NAT]

2. Consider a stack, which contains element 1, 2, 3, 4, 5, 6. Find the number of permutation can be obtained in the output if element '3' will popped out from the stack at 3rd position and element 1, 2, 3, 4, 5, and 6 can be input into stack in any order are _____. (Assume one element enter in stack only one time). [NAT]

3. Consider the following two functions:

void call 1 (int n)	void call 2 (int n)
<pre>{ if (n == 1) return 1; printf("%d", n); call 2 (--n); printf("%d", n); }</pre>	<pre>{ if (n == 1) return 1; printf("%d", n); call 1 (--n); printf("%d", n); }</pre>

The output printed when call 2 (6) is called is:

- A. 6 5 4 3 2 1 1 2 3 4
 B. 6 5 4 3 2 1 5 4 3 2
 C. 6 5 4 3 2 1 2 3 4 5
 D. 6 6 5 5 4 4 3 3 2 2 [MCQ]
4. Which of the following is true about linked list implementation of queue?
- A. In enqueue operation, if new node is inserted at the beginning of linked list, then in dequeue operation node must be removed from end.
 B. In enqueue operation, if new node is inserted at the end, then in dequeue operation node must be removed from the beginning.
 C. Both A and B
 D. None of the above [MCQ]
5. Consider the following code for two sorted (decreasing order) linked list with at least one common elements and header of linked list-1 is h_1 and header of linked list-2 is h_2 :

```
typedef struct node
{
```

```
    int value;
    struct node * next;
}
node * operation (node * h1, node * h2)
{
    node * P1, * P2;
    P1 = h1; P2 = h2;
    while (1)
    {
        if (P1 → value == P2 → value)
            return P1
        else if (P1 → value > P2 → value)
            P1 = P1 → next;
        else P2 = P2 → next;
    }
}
```

Which of the following is correct?

- A. It will return intersection of two linked list.
 B. It will return a pointer to 1st common node of two linked list.
 C. It will return a pointer to last common node of two linked list.
 D. None of the above. [MCQ]
6. Which of the following permutations can be obtained in the output (in the same order) using a stack assuming that the input is the sequence 5, 7, 8, 4, 6 in that order?
- A. 6, 8, 4, 7, 5
 B. 6, 4, 5, 7, 8
 C. 4, 8, 6, 7, 5
 D. 7, 8, 4, 6, 5 [MSQ]
7. Convert the following postfix expression into equivalent infix expression:
 Postfix expression "x 12 + z 17 y + 42 * / +".
- A. (x + 12 + z)/(17 + y * 42)
 B. x + 12 + z / 17 + y * 42
 C. x + 12 + z / (17 + y) * 42
 D. x + 12 + z / ((17 + y) * 42) [MCQ]

8. An empty queue is given in which 4 elements are going to be inserted then for enqueue it is taking 3 seconds and there is elapse time between enqueue – enqueue and dequeue – dequeue of 1 sec and for last element enqueue – dequeue is of 2 seconds. Then calculate the total time of all the 4 elements (from enqueueing all elements to dequeue all)?

A. 32 sec B. 30 sec
C. 40 sec D. 41 sec

[MCQ]

9. A stack S of integers initially contains the following data: 3, 7, 2, 6 (Top). The following code is executed on stack:

```
int x = S. pop();
int y = S. pop();
int z = S. pop();
S. push (x + y);
S. push (z);
```

After this code has been executed, what are the contents of the stack?

A. 8 B. 10, 10, 8
C. 15 D. 3, 8, 7

[MCQ]

10. There is a queue q with enqueue, dequeue operations, which has 8 elements with it as 4, 5, 6, 9, 1, 2, 3, 7 (4 is enqueued first and 7 at last). Then run the following given code. Here, S is the stack with push and pop operations.

```
for (i = 1; i <= 5; i++)
{
    x = q. dequeue ();
    S. push (x);
}
for (i = 1; i <= 3; i++)
{
    x = S. pop ();
    enqueue (x);
}
```

Find the order of elements after performing all operations in queue Q?

A. 4, 5, 6, 7, 3, 2 B. 4, 5, 6, 9, 1, 2
C. 2, 3, 7, 4, 5, 6 D. 2, 3, 7, 1, 9, 6

[MCQ]

Answer Key

1. (52)
2. (120)
3. (c)
4. (c)
5. (b)

6. (c, d)
7. (d)
8. (a)
9. (d)
10. (d)

Hints and Solutions

1. (52 to 52)

(I) Evaluation of postfix expression uses “operand stack”.

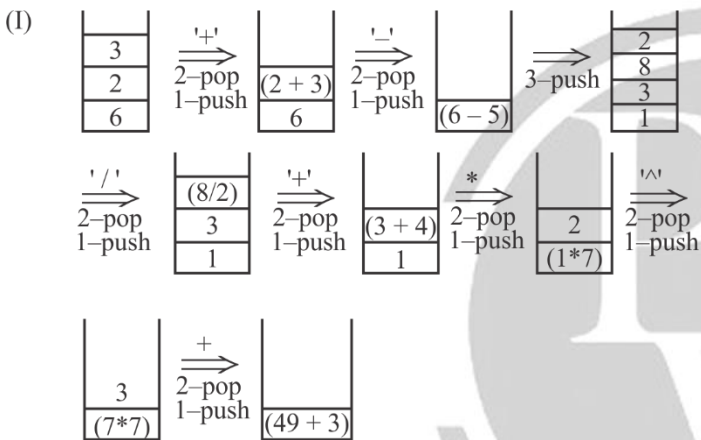
Step 1: Push operand in stack.

Step 2: Whenever operator found, perform 2 pop operation

(I) 1st pop: 1st operand

(II) 2nd pop: 2nd operand

Step 3: Perform “2nd operand “operator” 1st operand and push back the result to operand stack.



∴ the result of the given postfix expression is 52.

2. (120 to 120)

(I) It is given that element 3 will be popped out from the stack at 3rd position so, fix the 3rd position by '3'.

∴ Now,

Total number of ways:

$$\overline{6^{\text{th}}} \overline{5^{\text{th}}} \overline{4^{\text{th}}} \left(\overline{3^{\text{rd}}} \right) \overline{2^{\text{nd}}} \overline{4^{\text{th}}}$$

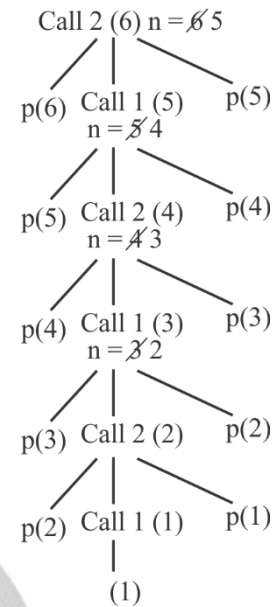
Fixed

(II) The remaining element can be pushed in any order. So, total number of permutation will be $5! = 120$ ways.

3. (c)

(I) When two functions calling recursively then draw the recursive tree to find the output.

(II) We are calling call 2 (6) :



So, the output for call 2(6):

6 5 4 3 2 1 2 3 4 5

4. (c)

To keep the “first in first out” order a queue can be implemented using linked list in 2-ways:

(I) If a new node is inserted at the beginning of linked list, then in dequeue operation, node must be removed from end.

(II) If a new node is inserted at the end of linked list then, in dequeue operation, node must be removed from beginning.

5. (b)

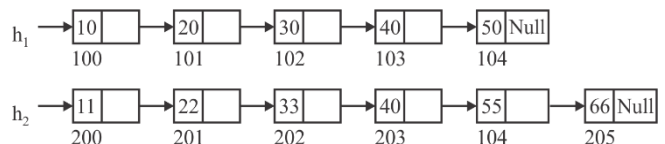
(I) The given program return the address of the node, when the node value of both the linked list are equal.

(II) The given program check element from start which are present in both the linked list.

(III) If element of linked list-1 node value is greater than linked list-2 node value then skip that node of linked list-1 else skip node of linked list-2.

(IV) This process continues until 1st common node or first common node in both the linked list reached.

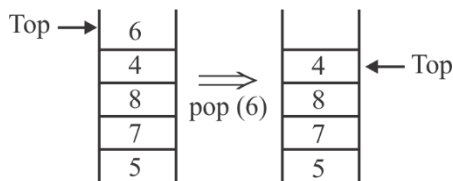
Example:



So, the given program will return address 103.

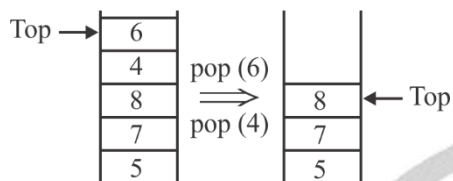
6. (c, d)

Option A: 6, 8, 4, 7, 5 : Incorrect



So, after popping element 6, only 4 can be popped.

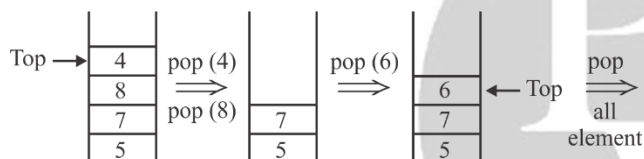
Option B: 6, 4, 5, 7, 8: Incorrect



So, after popping element 6, 4 TOP is 8

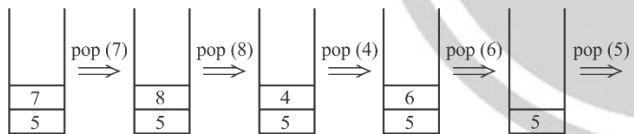
So, only 8 can be popped.

Option C: 4, 8, 6, 7, 5: Correct



So, order will be: 4, 8, 6, 7, 5

Option D: 7, 8, 4, 6, 5: Correct



7. (d)

For converting into the infix from postfix we have to look for the adjacent operator to the operands first:

(I) $x \ 12 \ + = x + 12$

(II) $17 \ y \ + = 17 + y$

(III) $17 \ y \ + \ 42 \ * = (17 + y) * 42$

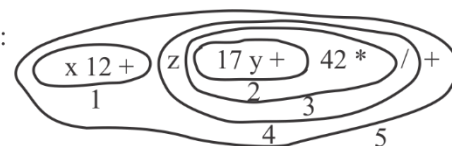
“Here ‘+’ operator evaluating before ‘*’ so, to make ‘+’ as high priority we are using bracket”.

(IV) $z \ 17 \ y \ + \ 42 \ * \ /= z / ((17 + y) * 42)$

“Here ‘/’ and ‘*’ both have same precedence but evaluating done from left to right. In above expression ‘*’ evaluating before ‘/’ that’s why we are using bracket”.

(V) $x \ 12 \ + \ z \ 17 \ y \ + \ 42 \ * \ /=$
 $= x + 12 + z / ((17 + y) * 42)$

Diagram:



8. (a)

(I) First we have to enqueue all the elements in the queue and then all the elements are dequeued from the queue.

(II) (i) For enqueue operations of 4 elements:

$$4 * 3 = 12 \text{ seconds}$$

(ii) 3 elapse time while enqueue 4 elements:

$$3 * 1 = 3 \text{ seconds}$$

(iii) Elapse time for the last element enqueue – dequeue = 2 seconds

(After enqueue 4th element we have to dequeue 1st element)

(iv) For dequeue operations of 4 elements:

$$4 * 3 = 12 \text{ seconds}$$

(v) 3 elapse time while dequeue 4 elements:

$$3 * 1 = 3 \text{ seconds}$$

$$\therefore \text{Total time} = 12 + 3 + 2 + 12 + 3 = 32 \text{ sec.}$$

9. (d)

(I) For the given stack “The Top of the stack have element 6”.

So,

Pop () will take the TOS:

$$x = 6$$

$$y = 2$$

$$z = 7$$

(II) Now stack having element “3” only so, push (x + y) = push (6 + 2)

push (8)

push (7)

(III) So, stack wil have elements:

3, 8, 7

10. (d)

(I) In the starting ‘Q’ have elements as

Q = 4, 5, 6, 9, 1, 2, 3, 7

- (II) After performing dequeue operation 5 times as loop is given up to 5, remaining 'Q' will be as $Q = 2, 3, 7$ and stack 'S' will be $S = 4, 5, 6, 9, 1$ (Top)
- (III) Then for the second "for loop" which will be executed three times, so the remaining elements in the stack $S = 4, 5$

and popped elements are "1, 9, 6", which enqueue in the Queue Q.

- (IV) So, the order of elements in the 'Q' after inserting these elements is

"2, 3, 7, 1, 9, 6".

Hence, option D is correct answer.



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