KATHMANDU UNIVERSITY
End Semester Examination
August/September, 2017

Mark Scored:

Level : B. Sc.   Course   : COMP 202
Year   : II   Semester : I

Exam Roll No.   :   Time: 30 min   F. M.   : 10

Registration No.:   Date   :

SECTION "A"
[20 Q × 0.5 = 10 marks]

Tick (√) the correct answer(s) or fill the blanks with most appropriate word/phrase.

1.   What is the postfix form of the expression (A+ B)*(C*D- E)*F / G?
      [ ] AB+ CD*E - FG /**   [ ] AB + CD* E - F **G /
      [ ] AB + CD* E - *F *G /   [ ] AB + CDE * - * F *G /

2.   In linear search algorithm the worst case occurs when
      [ ] The item is somewhere in the middle of the array
      [ ] The item is not in the array at all
      [ ] The item is the last element in the array
      [ ] The item is the last element in the array or is not there at all

3.   What does Merge sort use?
      [ ] divide-and-conquer   [ ] Backtracking
      [ ] heuristic approach   [ ] Greedy approach

4.   A variable P is called pointer if
      [ ] P contains the address of an element in DATA
      [ ] P points to the address of first element in DATA
      [ ] P can store only memory addresses
      [ ] P contains the DATA and the address of DATA

5.   The in order traversal of tree will yield a sorted listing of elements of tree in
      [ ] Binary trees   [ ] Binary search trees   [ ] Heaps   [ ] Expression Trees

6.   If every node u in G is adjacent to every other node v in G, A graph is said to be
      [ ] isolated   [ ] complete   [ ] finite   [ ] strongly connected

7.   Assume that the operators +,-, X are left associative and ∧ is right associative. The order
      of precedence (from highest to lowest) is ∧, X, +, -. The postfix expression corresponding
   to the infix expression a + b X c – d ∧ e ∧ f is
      [ ] a b c X + d e f ∧ ∧ -   [ ] a b c X+ d e ∧ f ∧ -
      [ ] b + c X d – e ∧f∧   [ ] - + a X b c∧ ∧d e f

8.   Suppose we are sorting an array of eight integers using quick sort, and we have just
      finished the first partitioning with the array looking like this: 2 5 1 7 9 12 11 10 which
      statement is correct?
      [ ] The pivot could be either the 7 or the 9
      [ ] The pivot could be the 7, but it is not the 9
      [ ] The pivot is not the 7, but it could be the 9
      [ ] Neither the 7 nor the 9 is the pivot.

9.   The condition top = -1 indicates that
      [ ] Stack is empty   [ ] Stack is full
      [ ] Stack has only one element   [ ] None of these

10. If the sequence of operations push(1),push(2), pop(), push(1), push(2), pop(), pop(), pop(), push(2), pop() are performed on a stack, the sequence of popped out values are ?
[ ] 2 2 1 2 2   [ ] 2 2 1 1 2   [ ] 2 1 2 2 1   [ ] 2 1 2 2 2

11. To delete an item in the middle of a circular doubly linked list, _____ no. of points to be manipulated
[ ] 2   [ ] 4   [ ] 6   [ ] 8

12. A linear list of elements in which deletion can be done from one end (front) and insertion can take place only at the other end (rear) is known as?
[ ] Queue   [ ] Stack   [ ] Tree   [ ] Linked list

13. What does the following function do for a given Linked List with first node as head?
```
          void fun1(struct node* head)
          {
           if(head == NULL)      return;
           fun1(head->next);
           printf("%d ", head->data);
          }
```
[ ] Prints all nodes of linked lists
[ ] Prints all nodes of linked list in reverse order
[ ] Prints alternate nodes of Linked List
[ ] Prints alternate nodes in reverse order

14. What is the output of following function for start pointing to first node of following linked list?
1->2->3->4->5->6
```
          void fun(struct node* start)
          {
                 if(start == NULL)    return;
                 printf("%d ", start->data);
                 if(start->next != NULL )
                 fun(start->next->next);
                  printf("%d ", start->data);
          }
```
[ ] 1 4 6 6 4 1   [ ] 1 3 5 1 3 5   [ ] 1 2 3 5   [ ] 1 3 5 5 3 1

15. For the undirected, weighted graph given below, which of the following sequences of edges may represents a correct execution of Prim's algorithm to construct a Minimum Spanning Tree?
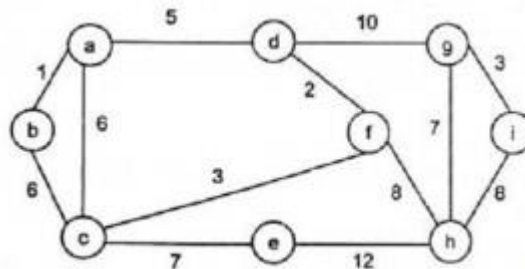
[ ] (a, b), (d, f), (f, c), (g, i), (d, a), (g, h), (c, e), (f, h)
[ ] (c, e), (c, f), (f, d), (d, a), (a, b), (g, h), (h, f), (g, i)
[ ] (d, f), (f, c), (d, a), (a, b), (c, e), (f, h), (g, h), (g, i)
[ ] (h, g), (g, i), (h, f), (f, c), (f, d), (d, a), (a, b), (c, e)

16.   What is common in three different types of traversals (Inorder, Preorder and Postorder)?
        [   ] Root is visited before right subtree
        [   ] Left subtree is always visited before right subtree
        [   ] Root is visited after left subtree
        [   ] There is no common procedure in all types of traversals

17.   Which of the following statement(s) is TRUE?
        I) A hash function takes a message of arbitrary length and generates a fixed length code
        II) A hash function takes a message of fixed length and generates a code of variable
            length
        II) A hash function may give the same hash value for distinct messages
        [   ] I only   [   ] II and III only   [   ] I and III only   [   ] II only

18.   Suppose a circular queue of capacity (n – 1) elements is implemented with an array of n
        elements. Assume that the insertion and deletion operation are carried out using REAR
        and FRONT as array index variables, respectively. Initially, REAR = FRONT = 0. The
        conditions to detect queue full and queue empty are
        [   ] Full: (REAR+1) mod n == FRONT, empty: REAR == FRONT
        [   ] Full: (REAR+1) mod n == FRONT, empty: (FRONT+1) mod n == REAR
        [   ] Full: REAR == FRONT, empty: (REAR+1) mod n == FRONT
        [   ] Full: (FRONT+1) mod n == REAR, empty: REAR == FRONT

19.   Consider a node X in a Binary Tree. Given that X has two children, let Y be Inorder
        successor of X. Which of the following is true about Y?
        [   ] Y has no right child   [   ] Y has no left child
        [   ] Y has both children   [   ] None of the above

20.   Which of the following is non-liner data structure?
        [   ] Stacks   [   ] List   [   ] Strings   [   ] Trees

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SECTION "B"
[6 Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1.   Trace quick sort on the array L= {35, 18, 67, 10, 7, 78, 99, 12, 80, 100}. Show the first
        partition and second partition results.

2.   What is Binary Search? How can you perform binary search over the data stored in an
        array? In what way it is different from Binary Search Tree?

3.   Compare adjacency matrix representation with adjacency list representation. Define the
        terms path and acyclic graph.

4.   Write down the algorithm to evaluate postfix expression. Trace a postfix expression as an
        example.

5.   Discuss linear queue as an abstract data type. How can you handle problems of linear
        queue?

6.   Trace to find minimum spanning tree using Prim's algorithm for figure 1. In what way it
        is different from Kruskal's algorithm?

Figure 1
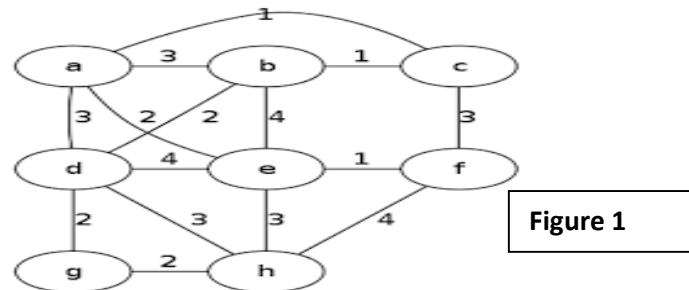
7.   What is asymptotic analysis? Explain the use of Big – oh notation in analyzing algorithm.

SECTION "C"
[8 Q. × 2 = 16 marks]

Attempt *ANY TWO* questions.

8.   Discuss the techniques to sort elements using selection sort and insertion sort.   [4+4]

9.   Write down the algorithm to delete elements in a Binary Search Tree. Discuss all the
        possible cases to delete the elements of nodes. Discuss post-order algorithm with a
        suitable binary tree.   [5+3]

10.   How can you implement insertion and deletion on doubly linked list? Discuss, how can
        you reverse the DLL?

                                                                                              [6+2]