MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER

SCHOOL OF SCIENCE AND INFORMATION SCIENCES
UNIVERSITY EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: COM 2208
COURSE TITLE: DATA SRTUCTURES.

DATE: 25TH APRIL, 2019 **TIME: 1100 1300 HRS**

INSTRUCTIONS

1. Answer Question ONE and any other TWO Questions From Section II
2. Question 1 is compulsory.
3. Time 2HRS.
4. ***Mobile phone are not allowed in exam room***.

Section I, Compulsory (30 marks)

A) Define the following terms **[4 marks]**
   i. Algorithm.
   ii. Data structure.

B) Given the following queue operations on an empty existing queue called nameQueue. What would be displayed after the series of operations?
[2 marks]

```
nameQueue.enqueue(Sid)
nameQueue.enqueue(Sal)
nameQueue.enqueue(Sue)
nameQueue.enqueue(Sam)
nameQueue.dequeue()
display (nameQueue.peekFront())
```

C) What would we expect this for loop to do?
[2 marks]

```
for (position = 1 through aList.getLength())
{
dataItem = aList.getEntry(position)
print(dataItem)
}
```

D) Given the array [4, 15, 8, 3, 28, 21], determine the state of the array after a second swap of the selection sort. Show all your working in the answer booklet.
[3 marks]

E) How does the quicksort partition an array? **[2 marks]**

F) Describe any two desirable properties of an algorithm **[4 marks]**

G) Explain an advantages that arrays have over linked lists **[2 marks]**

H) A stack is initially empty, then the following commands are performed:

push 5, push 7, pop, push 10, push 5, pop. Give the list of elements in the stack after the operations. Explain your answer (assume the top of the stack is from the left).

[3 marks]

I) What is the difference between the stack pop and top operations?

[4 marks]

J) What restriction does the array-based implementation of a stack place on the push operation?

[2 marks]

K) Describe what happens when we insert a new item into the middle of the list.

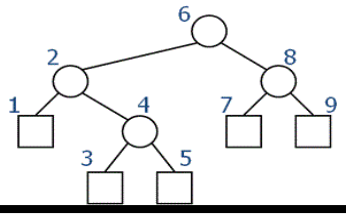
[2 marks]

L) List differences in operations between the list as opposed to the stack or queue.

[2 marks]

M) Perform a post order traversal of the following tree.

[3 marks]



SECTION II -CHOOSEANY TW

Question Two (15 Marks)-CLO 2

A) Write a complete C++ program to implement a stack. Your program should give a user the following options to choose from, which then, it implements.

1. **Insert an element into a stack.**
2. **Delete an element from the stack.**
3. **Determine the size of the stack.**
4. **Display the top element of the stack**
5. **Exit.**

Question Three (15 Marks)-CLO 1, 2

(a) Describe the following list operations **[6 marks]**

i. Insert
ii. Delete
iii. Merge

(b) Describe the following stack operations **[6 marks]**

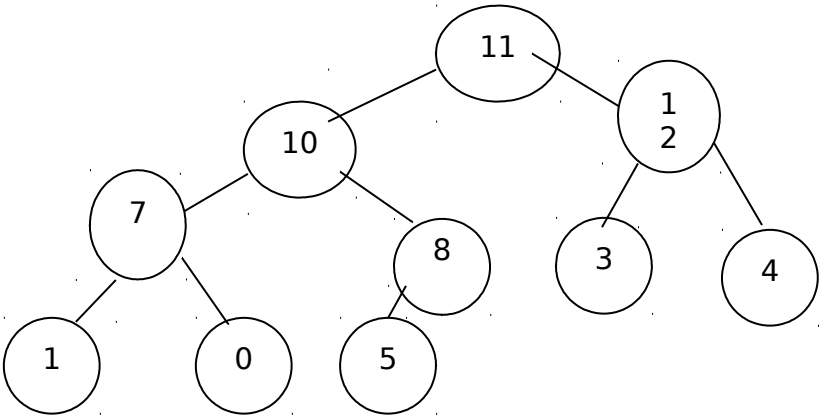
iv. Empty(s)

v. Makenull(s)
vi. Push

(c) Describe a linked list. You may use an appropriate diagram. **[3 marks]**

Question Four (15 Marks)-CLO 3

(a) Does the following tree meet the heap property of a binary tree? Explain your answer. If your answer in no, draw a tree, using the same elements, that meets the heap property.- **[8 marks]**



(b) Use the appropriate tree in (a) above to sort the following array in ascending order. **[12 marks]**

12	10	11	7	8	3	4	1	0	5

//END