Group: Max 3 students in a group.

Submission date: 4 September 2014 before 2pm

Hand written answers to be submitted. Please make a photocopy for your own references.

This question paper consists of FOUR (4) questions. Answer ALL questions.

QUESTION 1 [TOTAL: 25 MARKS]

a. Write the output from the code given below. [4marks]

```
#include <iostream>
using namespace std;

double getTotal(int *arr, int size);

 double getTotal(int *arr, int size)
 {
    int    i;
  double sum;

  for (i = 0; i < size; ++i)
  {    sum += arr[i];  }
    return sum;
 }

int main ()
{
   int sales[5] = {10, 60, 54, 18, 12};
   double total, avg;

   total = getTotal( sales, 5 ) ;
   avg = total /5;

   cout << "The Total sales for this year: " << total <<
endl;
    cout << "The Average sales for this year: " << avg
<< endl;
   return 0;
}
```

Write a C++ code statement that will prompt the user to enter five even numbers to calculate the *median even numbers*. The program may identify the even and odd numbers entered by user.

[18 marks]

Sample output:

```
Enter mark: 27
Please enter even numbers!
Enter mark: 26
Enter mark: 32
Enter mark: 77
Please enter even numbers!
Enter mark: 54
Enter mark: 66
Enter mark: 42
Median number is: 42
Press any key to continue…
```

b. Consider the following statements.

```
struct nameType
{string first;
String last; };

struct employeeType
{
nameType name;
int performanceRate;
int pID;
string dept;
double salary;
};
employeeType employees[100];
employeeType newEmployee;
```

Mark the following statements as valid or invalid. If a statement is invalid, explain why.

[3 marks]

i. employees.salary = 0;

ii. employees[35] = newEmployee;

QUESTION 2 [TOTAL: 25 MARKS]

a. Write a C++ code segment a linked list by adding new nodes to the end of the list. [10 marks]

b. Show the expected output for the below program. [10 marks]

```
int main()
{
ADTstack st;
cout<<st.pop ()<<endl;
st.push (55/5);
st.push(33*2);
st.push(82-9);
cout<<st.pop()<<endl;
st.push(28);
st.push(16%5);
cout<<st.pop()<<endl;
for(int i =0; i<6; i++)
cout<<st.pop()<<endl;
st.push(12);
}
```

c. Evaluate the following postfix notation. [5 marks]

i. 8 2 +3 * 16 4 / -
ii. 12 25 5 1 / / * 8 7 + -

QUESTION 3 [TOTAL: 25 MARKS]

a. Given below is an array of seven integers. [15 marks]

66 32 22 83 48 51 74

What would be the value of the elements in the array after being sorted in ascending order using :

i. Selection sort
ii. Bubble sort

Show the result of each passes for both algorithms.

b. The following code lists the nodes in a binary three in two different orders:

preorder: A B C D E F G H I J K L M
inorder: C E D F B A H J I K G M L

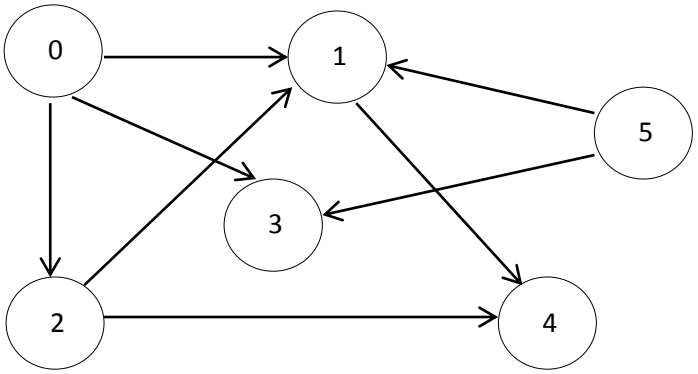
Draw the binary three. [10 marks]

QUESTION 4 [TOTAL: 25 MARKS]

a. The records with the keys 456, 235, 268, 428, 104, 273, 126, 316 are to be stored in an array of size 10 using the Hash Function. Show the index for each key and the result of the hash table when the following integers are inserted in the order given using *quadratic probing*.

[15 marks]

b. Draw the adjacency list of the **Graph A** below. [10 marks]



Graph A