**Assignment1**

(2) What is an Algorithm? Give three examples

Ans: Algorithm is process of executing set of steps/instructions in order to solve any problem in computer science domain.

Examples:

(1) Sorting algorithms: There are various sorting algorithms like mergesort, bubblesort, quicksort etc which are guiding steps to perform sorting for any set of data.

(2) Arithmetic operation: Any arithmetic operation like adding two number, multiplying two number are also example of algorithms to solve any mathematics problem using specific steps to achieve result.

(3) Any Linear Algebra problems like solving linear equation or quadratic equation is also a good example of algorithm which follow steps to solve equations based on number of input for a given mathematical equation.

(3) What is time and space complexity of an algorithm?

Ans: Time Complexity: It represents the amount of time taken by the algorithm to run as a function for given length of input data.

Space Complexity: It represents the amount of space/memory occupied by the algorithm to run as a function for a given length of input data.

Example:

Private int sum = 0;

For (int i=0; i<n;i++)

{

Stmt;

}

For this example, Time complexity is O(n)

(4) What is the time complexity of the following code, and why?

public makeSentence (String[] words) {

String sentence=“”;

for (String w:words)

{

sentence+=w;

}

return sentence;

}

Ans: time complexity of above code is O(n^2) because string is immutable object so for every loop iteration, it actually creates new string object which make n^2 time to execute the loop.

(5) What are all Stack operations, explain.

Ans: Below are stack operations:

(1) Create stack (init): This operation creates empty stack with chosen data structure like array or linked list.

(2) Push: Push operation add element in LIFO fashion into data structure to hold the data.

(3) Pop: Pop operation remove element from data structure like array or linked list.

(4) IsEmpty : IsEmpty operation check weather stack is empty or not and return Boolean value.

(5) IsFull: IsFull operation check weather stack is full or not and return Boolean value according to that.

(7) Time complexity –

Push Operation: O(1). Push operation will be executed only 1 time for every element of input data.

Pop Operation: O(1). Push operation will be executed only 1 time for every element of input data.

Space Complexity-

Push Operation: 5 Byte for inserting one element

Pop Operation: 2 Byte for popping one element

(8) Time complexity –

Push Operation: O(1). Push operation will be executed only 1 time for every element of input data.

Pop Operation: O(1). Push operation will be executed only 1 time for every element of input data.

Space Complexity-

Push Operation: 5 Byte for inserting one element

Pop Operation: 1 Byte for popping one element

(9) Time complexity –

Push Operation: O(n). For worst case, doubling the array size will be same as the size of original array which means the complexity will be O(n).

Pop Operation: O(n). For worst case, halving the array size will be same as the size of original array which means the complexity will be O(n).

Space Complexity-

Space complexity will be between 8N(When array is full) and 32N(when array is one-quarter full).