

UES103 MST solutions (21-Oct 2024) Marks 30 (5x6=30)

(These are sample solutions and some questions can have more than one right answer).

Most of the exams were messy and solved out of order. No rechecking for mess, out of order and pencil attempts since students can modify the solutions. No partial credit for big mistakes. Improve your writing skills to score better in EST. Plan on the last page before starting to avoid cuttings. Do not leave any pages blank in between without a reason.

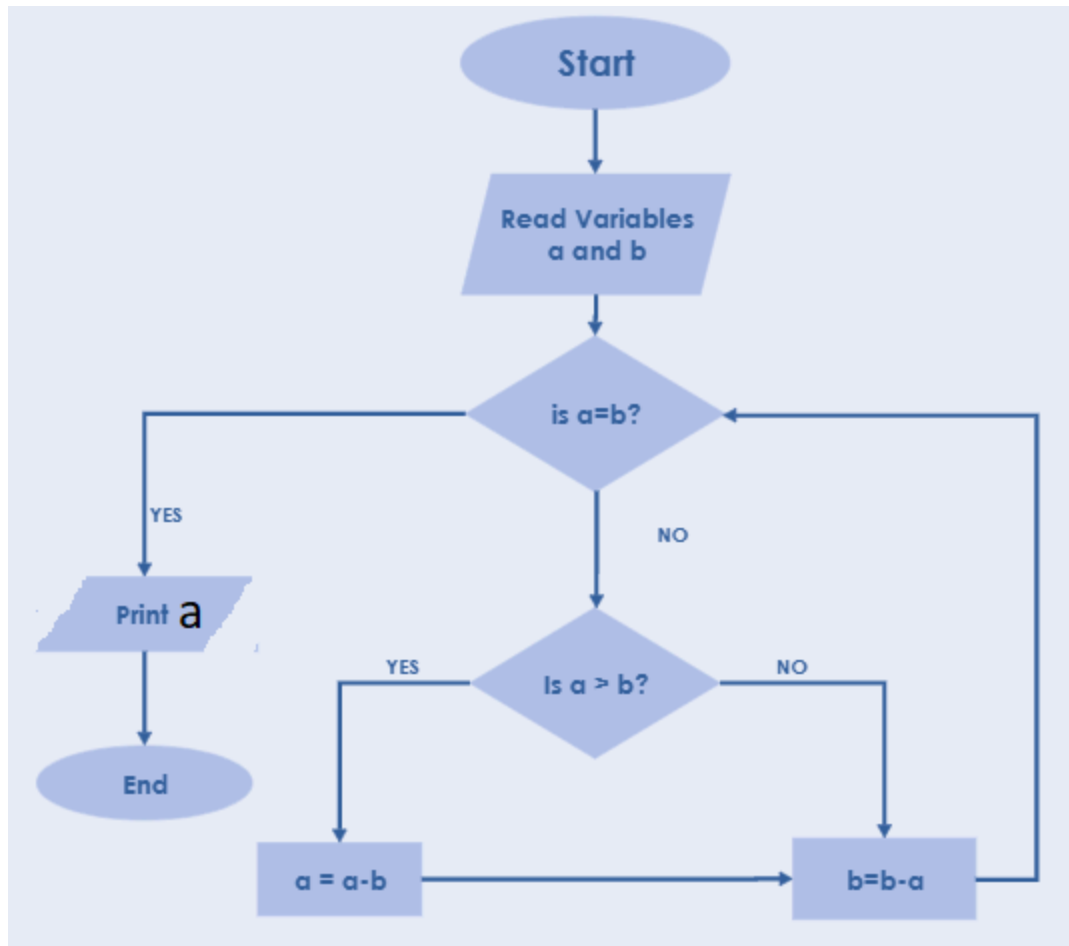
Q1: Convert the following:binary

- (a) 1010 0111 unsigned binary to decimal
- (b) If 1010 0111 is a signed binary number using signed bit representation, then what is its decimal equivalent?
- (c) 43 to an unsigned number
- (d) -43 to binary using sign bit representation
- (e) x

Solution: (a) 167 (b) -39 (c) 101011 (d) 1101011 (e) you need 7 bits (why?) because -43 to 0 and then till +43 is between [64,128]. So $43 = 0101011$ and $-43 = 1010101$.

Q2: Make a nice flowchart to calculate the highest common factor (hcf) of two positive integers. For example, $\text{hcf}(6,8) = 2$

Solution: You should not use any language syntax in the flowchart. No for loop, no printf, scanf etc. Algo and flowchart are free from any computer language syntax



Write a C program which asks the user to input a string (character array) and it flips the cases of each character. For example if input is “Hasta La Vista” then the output → “hASTA lA vISTA”

Solution:

```

#include<string.h>
#include<stdio.h>
int main(){
char S[50];
int i,j,n;
puts("Enter string: ");
gets(S);n = strlen(S);
for(i=0;i<n;i++){
if(S[i]>='a' && S[i]<='z') S[i]-=32; // ASCII conversion of letters
else if(S[i]>='A' && S[i]<='Z') S[i]+=32;
}
puts(S);

```

```
return 0;
}
```

Q4: The life cycle of a C program refers to the series of stages a program undergoes from the moment it is written until it is executed and terminated. These stages transform the human-readable source code into an executable machine-level program that can be run on a computer. The key phases of this life cycle are: editing, preprocessing, compilation, assembly, linking, loading, execution and termination.

Draw a clear diagram and explain the role of each phase.

Solution: Given in the Slides.

Q5: A student tried to write a C program to find the factorial of an integer but made so many mistakes being a new learner. Mention the line numbers along with corrections. Do not rewrite the whole code otherwise points cut ✂

```
1. #include<stdio.h>
2. int main() {
3.     int num, factorial = num;
4.     printf("Enter a number: ");
5.     scanf("%d", factorial);
6.     if (num > 0) {
7.         printf("Factorial of a negative number doesn't exist.\n");
8.     } else {
9.         for (i = 1, i <= num, ++i) {
10.            factorial = n*i;
11.        }
12.        printf("Factorial = n!", factorial);
13.    }
14.    return 0
15. }
```

Solution: L3: num not initialized before assigning to factorial. L5: Why scanning factorial? L6: num<0, L9: for loop has commas instead of semicolon, L12 should have %d instead of n! etc.
0

Q6: Complete the following boxes for the Bubble sort algorithm. No points for any theory or program, just complete these in your answer sheet clearly.

Solution: This question is directly related to Let Us C problem:

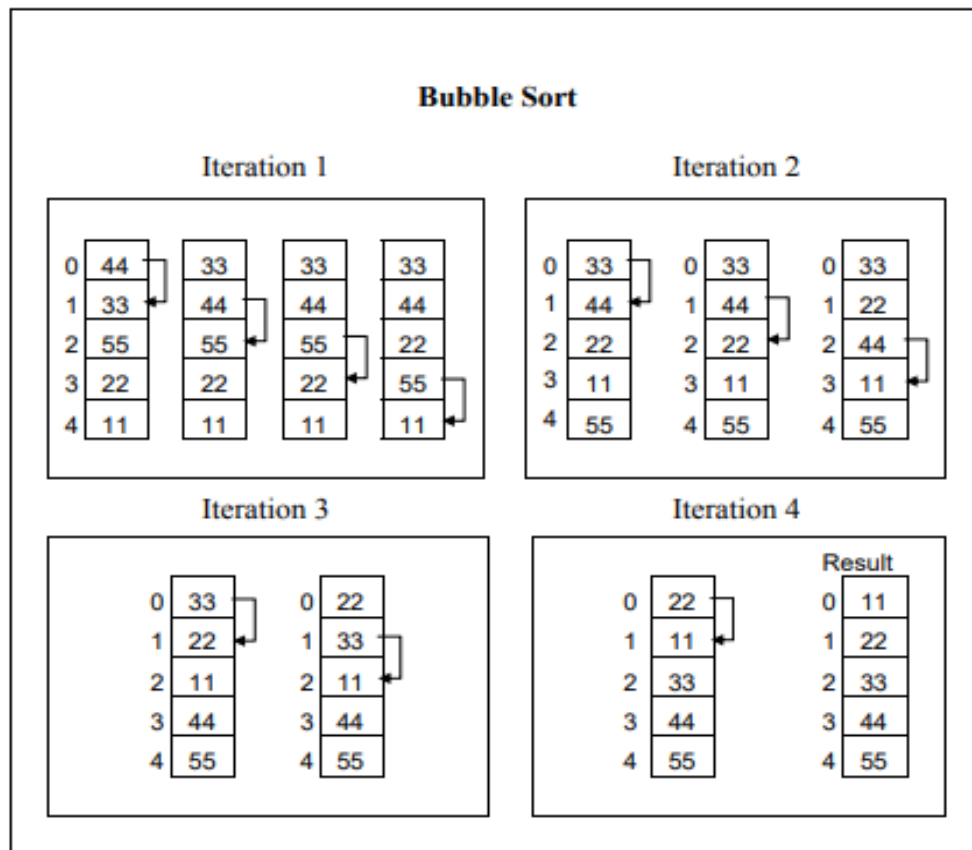


Figure 8.11 (b)