

Indian Institute of Engineering Science and Technology, Shibpur  
B.Tech. 2<sup>nd</sup> Semester Final Examination, May 2024  
Introduction to Computing (CS - 1201)

Time: 3 hours

Full Marks: 50

Answer any five [5x10]  
Extra attempts will NOT be evaluated.  
For programming problems use C language.

1. (a) Convert the given numbers to the indicated bases: (i)  $(7562.45)_{10} \rightarrow (?)_8$ , (ii)  $(630.4)_8 \rightarrow (?)_2$ .  
(b) Using 8-bit signed-2's-complement representation for negative numbers, compute  $(+27) + (-12)$ .  
(c) Perform  $X - Y$  with the following unsigned binary numbers taking 2's complement of the subtrahend:  $X = 1011101$  and  $Y = 1010011$ .

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$[(2 + 2) + 3 + 3 = 10]$

2. (a) Minimize the following logic expressions using Boolean algebra:

(i)  $x'y'z + x'yz + xy'$

(ii)  $ab + a'c + bc$

- (b) Realize  $X + Y.Z$  using only NOR logic.

$[(4 + 4) + 2 = 10]$

3. (a) Answer the following in relation to designing a half-adder using logic gates:

i. Derive the truth table defining the relation between inputs and outputs.

ii. Give the Boolean expression for each output and draw the logic diagram.

- (b) Answer the following in relation to designing a full adder using logic gates:

i. Derive the truth table defining the relation between inputs and outputs.

ii. Give the Boolean expression for each output and draw the logic diagram.

$[(2 + 2) + (3 + 3) = 10]$

4. (a) Why is specifying the array name sufficient to pass an entire array to a function?

- (b) Write a function that takes a two-dimensional array of integers as input and finds the largest element's value and position. The two-dimensional array should be taken as input in the `main()`.

$[2 + 8 = 10]$

5. (a) Why do strings have a terminating null character?

- (b) Write a function to reverse an input string `str`. You have to declare `str` in the `main()` and pass it as a parameter to the string reversal function (Do NOT use any standard library functions for string operations.)

$[2 + 8 = 10]$

6. (a) How are the members of a structure accessed? Give an example.

- (b) Declare a structure `student` to store the following information of a student: Enrollment number, Name, Year, Department number, and CGPA. Write two functions to carry out the following:

i. Read the above information for  $n$  students, where  $n$  is user provided input.

ii. Display information for those students whose  $CGPA \geq 9.0$ .  $[2 + (2 + 3 + 3) = 10]$

7. (a) What is FILE keyword? What are the functions of the following file operations: `fopen()`, `fclose()`, `getc()`, and `putc()`.

- (b) Write a program to compare files by declaring two pointers to FILE. The program should compare the contents if `f1.txt` and `f2.txt` are two input files.

$[(1 + 4) + 5 = 10]$

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