

Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. 2nd 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:

$$\begin{aligned}(i) & x'y'z + x'yz + xy' \\(ii) & ab + a'c + bc\end{aligned}$$

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

[(4 + 4) + 2 = 10] 15

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 ≥ 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] D D