

Indian Institute of Engineering Science and Technology, Shibpur
B.Tech. 1st Semester Mid-term Examinations, 2021
Introduction to Computing (CS 1101)

Time: 45 minutes

Full Marks: 30

Answer any three questions.

For the programming problems use C language.

1. (a) What is the primary memory and secondary memory of a typical computer? Name them.
(b) What exactly is stored in memory, starting from location X, in hexadecimal for the string `char s[] = "IEST";` ?
(c) What is Gray code? Give an example of the use of Gray code.
(d) Write the code ASCII for the characters 'A', 'a', '0' and the *newline* in hexadecimal.

[2½ × 4]

2. (a) Simplify the following boolean expression and draw the logic circuit diagram for it.

$$f(a, b, c) = \bar{a}b + \bar{c}(a + b)$$

- (b) What do you mean by universal gate? Show that NAND gate is a universal gate.

[5 + 5]

3. (a) Convert the following numbers from the given base to the desired base.
 - i. $(232)_{10}$ to base 2
 - ii. $(15AB)_{16}$ to base 8(b) Subtract N from M using i) i's complement and; ii) 2's complement methods, where $M = 0110$ and $N = 0010$ are two integers.

[2½ × 2 + 2½ × 2]

4. (a) Write a program to evaluate the following series $S = 1 - 4 + 9 - 16 \dots$ up to n^{th} term. Here n is a user input.
(b) Write a program to generate the Fibonacci sequence up to n^{th} term where n is a input given by the user.

$0 \ 1 \ 1 \ 2 \ 3 \ 5 \ 8$ up to n^{th} term ...

The Fibonacci numbers are generated by initializing $F_0 = 0$, $F_1 = 1$ and using the following formula.

$$F_n = F_{n-1} + F_{n-2}$$

[5 + 5]

5. (a) Write a program that can accept 10 integers in an array, compute and print the sum, average, minimum and maximum of those 10 integers.
(b) Write a program to conclude whether $f(g + h) = f(g) + f(h)$ where $g(x) = 2x^2 + 6$; $h(x) = 6x^2 + 2$, and $f(x) = x$ for $0 \leq x \leq 100$.

[5 + 5]