

**Indian Institute of Engineering Science and Technology, Shibpur**  
**B.Tech. 1<sup>st</sup> 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 ASCI for the characters 'A', 'a', '0' and the *newline* in hexadecimal.

$[2\frac{1}{2} \times 4]$

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.

$[2\frac{1}{2} \times 2 + 2\frac{1}{2} \times 2]$

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.

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

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  $0 \leq x \leq 100$ .

$[5 + 5]$