Indian Institute of Engineering Science & Technology, Shibpur

B.Tech (3^{rd} Semester CST) Mid-Semester Examination, 2020

Digital Logic (CS 2102)

F.M. 30 Time: 45 minutes

1. (a) Determine the possible unknown base of the following relation: $\sqrt{22} = 6$.

(b) Represent the following decimal numbers in *BCD* and perform the *BCD* addition. The two numbers are 28 and 39.

(c) Obtain the simplified expression in sum of the products for the following Boolean function.

$$f(a, b, c, d) = \sum m(2, 3, 7, 9, 11, 13) + \sum d(1, 10, 15)$$

[2 + 3 + 5]

2. Design a combinational circuit that detects an error in the representation of a decimal digit in *BCD*. In other words, obtain a logic diagram whose output is logic 1 when the inputs contain an unused combination in the code. Implement the circuit using two inputs NAND gates. [5]

3. Consider the following state table of a Moore Machine and find the equivalent states. Here, $PS \Rightarrow$ Present state, $NS \Rightarrow$ Next state, and $x \Rightarrow$ Input. [8]

	NS		
PS	x = 0	x = 1	Output
A	D	C	0
B	F	H	0
C	E	D	1
D	A	E	0
E	C	A	1
F	F	B	1
G	B	H	0
H	C	G	1

4. Design the binary counter having the following binary sequence: 0, 4, 2, 6, and repeat. Use *JK* flip-flop. [7]