**Digital Logic System CSC 201**

**Section B Tutorial Questions**

**Question 1**

**a.** Explain the operation of the following using their function table and circuit diagram (**3marks each)**

1. S-R Flip Flop
2. D Flip Flop
3. J-K Flip Flop
4. T-Flip Flop

b. Highlight three applications of Flip Flop. (**3 marks**)

**Question 2**

1. Implement full adder with a decoder**.**

S**(**x, y, z**) =** ∑ (1, 2, 4, 7)

C(x, y, z) = ∑ (3, 5, 6, 7) (**6 marks**)

1. Mention four applications of a decoder**. (4 marks)**
2. Four logic signal lines A, B, C, D are being used to represent a 4-bit binary number with A as the MSB and D as the LSB. The binary inputs are fed to a logic circuit that produces a HIGH output only when the binary number is greater than 01102 = 610. Design this circuit. **(5 marks)**

**Question 3**

1. Implement the following with a multiplexer.
2. F(A, B, C, D) = Ʃ(1,3,4, 11,12, 13,14, 15)
3. F(A, B, C, D) = Ʃ(0,1,3,4,8,9,15)
4. F(x,y,z) = Ʃ(1,2,6,7) (**3 marks each**)
5. Distinguish between combinational circuit and sequential circuit. Give four examples of each. (**6 marks**)

**Question 4**

1. Design a logic circuit whose output is HIGH only when a majority of inputs A, B and C are low. (**5 marks**)
2. Design combinational circuit to perform subtraction of two bits; X and Y to give outputs Borrow and Difference. **(5 marks** )
3. Design a 4:1 line Muitiplexer using any available logic gates. (**5 marks)**

**Question 5**

1. Design a full subtractor circuit with decoder IC. (**6 marks**)
2. Design an 8:3 encoder circuit (**4 marks**)
3. Implement the function F (A,B,C) = Σ (1,3,5,6) using 3:8 lines decoder. (**5 marks)**

**Question 6**

1. Design a 4:1 line multiplexer circuit. (**6 marks**)
2. Distinguish between multiplexer and demultiplexer. (**3 marks**)
3. Explain three applications of a multiplexer. (**3 marks**)
4. Draw the circuit diagram to implement X=AB [A+C]**ʹ (3 marks)**

**Question 7**

Draw the circuit diagram that implements each of the following expressions;

1. F = AB + B’C
2. F = AC + BC’ + A’BC
3. F = (A’+ B’)’ BC
4. F = (M+N)’ + P’Q
5. F= (AB(C+D))’ (**3 marks each**)