南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

CS211 Digital Logic (H)

Assignment 4
Due on 23:55, Aug. 3, 2022

Write down your answer to the questions in the given box with **detailed** procedures. For design questions, only drawing the circuit will lead to zero point.

Name: _____ Student ID: _____

Question:	1	2	3	4	Total
Points:	20	30	25	25	100
Score:					

1. (20 points) Design a sequence generator to generate the sequence 111011.

2. (30 points) (a) List the eight unused states in a 4-bit Johnson's counter. Determine the next state for each unused state and show that, if the circuit finds itself in an invalid state, it does not return to a valid state.

   (b) Modify the circuit so that the circuit reaches a valid state from any one of the unused states.

3. (25 points) Design a synchronous counter that has the following sequence: 0010, 0110, 1000, 1001, 1100, 1101, and repeat. From the undesired states the counter must always go to 0010 on the next clock pulse.

4. (25 points) The code tabulated below is the XS3 code representation for the decimal digits. Develop a set of rules for adding together two decimal digits expressed in XS3 form, and hence perform the operation $(34)_{XS3} - (19)_{XS3}$ using 10's complement arithmetic.

	XS3 code		XS3 code
0	0011	5	1000
1	0100	6	1001
2	0101	7	1010
3	0110	8	1011
4	0111	9	1100