

Mahidol University, International College & Faculty of Engineering
Department of Computer Engineering
Final Examination
EGCI 234: Digital Circuit Design (T2/2021-22)

WebEx Q6

Date: 4 April 2022

Time: 2 Hours

Total Mark: 50 marks

Instruction: Answer all questions and submit to our Google Classroom

Questions 1 & 2 25 minutes/ 5 & 9 marks (1000-1025) **MSI & Arithmetic Circuits**

- 5 min break -

Questions 3 15 minutes/ 3 & 5 marks (1030-1045) **Flip Flops**

- 5 min break -

Questions 4 20 minutes/ 10 marks (1050-1110) **Sequential Circuit Design**

- 5 min break -

Questions 5 20 minutes/ 4 & 8 marks (1115-1135) **ADC & DAC**

- 5 min break -

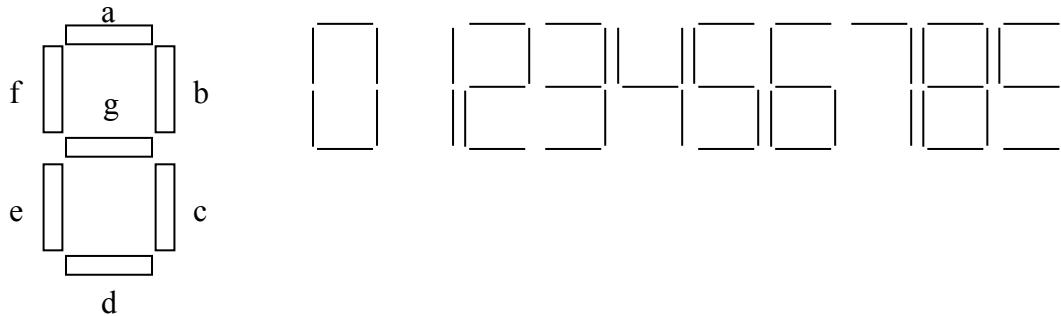
Questions 6 10 minutes/ 6 marks (1140-1150) **Digital Circuit Design**

Explanation

Examination will start at 1000. Questions 1 & 2 will be released via Google classroom. Students have 25 minutes to answer the question and submit to Google classroom before deadline (ie. 1025). Followed by 5-minute break. Then questions 3 will be released ..

(6 marks) Digital Circuit Design

(6 marks) Q6 Inputs of the circuit are priority switches (i.e. sw9 (highest priority) .. sw0 (lowest priority)) and the output is the 7-segment display. Priority switch means that if user simultaneously pressed buttons 'sw8' and 'sw3' then output will display '8'. Find Boolean expression of priority switch for segment 'A'.



SW0	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	a	b	c	d	e	f	g
1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
x	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
x	x	1	0	0	0	0	0	0	0	1						
x	x	x	1	0	0	0	0	0	0	1						
x	x	x	x	1	0	0	0	0	0	0	0	0	0	0	0	0
x	x	x	x	x	1	0	0	0	0	1						
x	x	x	x	x	x	1	0	0	0	0	0	0	0	0	0	0
x	x	x	x	x	x	x	1	0	0	1						
x	x	x	x	x	x	x	x	1	0	1						
x	x	x	x	x	x	x	x	x	1	1						

$$\begin{aligned}
 a = & \overline{SW_0} \overline{SW_1} \overline{SW_2} \overline{SW_3} \overline{SW_4} \overline{SW_5} \overline{SW_6} \overline{SW_7} \overline{SW_8} \overline{SW_9} \\
 & + \overline{SW_2} \overline{SW_3} \overline{SW_4} \overline{SW_5} \overline{SW_6} \overline{SW_5} \overline{SW_6} \overline{SW_7} \overline{SW_8} \overline{SW_9} \\
 & + \overline{SW_3} \overline{SW_4} \overline{SW_5} \dots \overline{SW_9} \\
 & + \overline{SW_5} \overline{SW_4} \overline{SW_6} \dots \overline{SW_9} \\
 & + \overline{SW_6} \overline{SW_7} \overline{SW_8} \overline{SW_9} \\
 & + \overline{SW_7} \overline{SW_8} \overline{SW_9} + \overline{SW_8} \overline{SW_9} + \overline{SW_9}
 \end{aligned}$$