

[CENG 232 - All Sections] Logic Design

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Started on Wednesday, June 30, 2021, 1:45 PM

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Completed on Wednesday, June 30, 2021, 3:14 PM

Time taken 1 hour 29 mins

Grade 91.00 out of 100.00

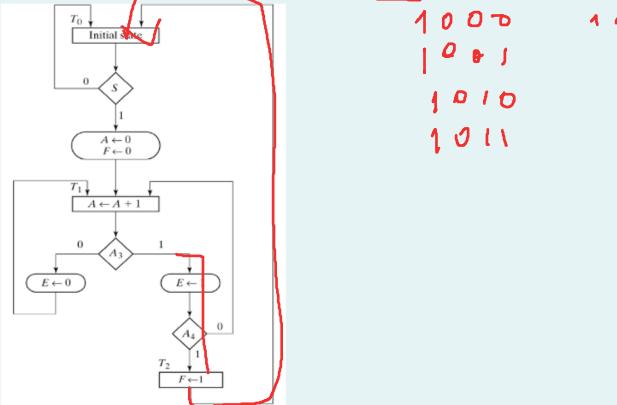
Question 1

Correct

4.00 points out of 4.00

Flag question

Given the ASMD chart, fill in the rest of the following state table.



Counter	Flips-flops	Conditions	State
A1 0 0 0 0 0 0 0 0	E 1 0 0 0 0 0 0 0	A3=0, A4=0	T1
A2 0 0 0 0 0 0 0 0	F 0 0 0 0 0 0 0 0		
A3 0 0 1 0 1 0 1 0			
A4 0 1 1 0 1 1 1 0			
		A3=1, A4=0	
		A3=1	
		A3=0, A4=1	

- a. 1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 0 0 T1
 1 1 0 1 0 0 T2
 1 1 0 1 1 1 T0
- b. 1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 1 0 T2
 1 1 0 1 1 0 T2
 1 1 0 1 1 1 T0
- c. 1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 0 0 T1
 1 1 0 1 1 0 T2
 1 1 0 1 1 0 T2
- d. 1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 1 0 T2
 1 1 0 1 1 1 T2
 1 1 0 1 1 1 T0

Your answer is correct.

The correct answers are:

1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 0 0 T1
 1 1 0 1 1 0 T2
 1 1 0 1 1 1 T0,
 1 0 0 1 0 0 A3=0, A4=1 T1
 1 0 1 0 0 0 A3=0, A4=1 T1
 1 0 1 1 0 0 A3=0, A4=1 T1
 1 1 0 0 1 0 T2
 1 1 0 1 1 1 T2
 1 1 0 1 1 1 T0,

1	0	0	1	0	0	A3=0, A4=1	T1
1	0	1	0	0	0	A3=0, A4=1	T1
1	0	1	1	0	0	A3=0, A4=1	T1
1	1	0	0	1	0		T2
1	1	0	1	1	0		T2
1	1	0	1	1	1		T0,
1	0	0	1	0	0	A3=0, A4=1	T1
1	0	1	0	0	0	A3=0, A4=1	T1
1	0	1	1	0	0	A3=0, A4=1	T1
1	1	0	0	0	0		T1
1	1	0	1	1	0		T2
1	1	0	1	1	0		T2

Question 2

Correct

3.00 points out of 3.00

Flag question

Which one of the following statements is WRONG?

- a. Datapath unit uses the external inputs to determine the sequence of command signals X
- b. An internal feedback path from the datapath unit to the control unit provides status conditions ✓
- c. Datapath unit manipulates data in registers according to the system's requirements ✓
- d. Control unit issues a sequence of commands to the datapath unit ✓

Your answer is correct.

The correct answer is:

Datapath unit uses the external inputs to determine the sequence of command signals

Question 3

Correct

3.00 points out of 3.00

Flag question

Which one of the following is wrong for a computer instruction in the Basic Computer designed by Mano?

- a. An instruction contains an address that specifies the registers and/or locations in memory to use for the operation defined in the instruction. X
- b. An instruction contains one bit to indicate the addressing mode. ✓
- c. An instruction contains an opcode (Operation Code) that specifies the operation for that instruction. ✓
- d. An instruction contains one or more bits to indicate whether there is an interrupt or not X

1	1	0	0	0	0	T1
1	1	0	1	1	0	T2
1	1	0	1	1	0	T2

Question 2

Correct

3.00 points out of 3.00

Flag question

Which one of the following statements is WRONG?

- a. Datapath unit uses the external inputs to determine the sequence of command signals X
- b. An internal feedback path from the datapath unit to the control unit provides status conditions
- c. Datapath unit manipulates data in registers according to the system's requirements
- d. Control unit issues a sequence of commands to the datapath unit

Your answer is correct.

The correct answer is:

Datapath unit uses the external inputs to determine the sequence of command signals

Question 3

Correct

3.00 points out of 3.00

Flag question

Which one of the following is wrong for a computer instruction in the Basic Computer designed by Mano?

- a. An instruction contains an address that specifies the registers and/or locations in memory to use for the operation defined in the instruction.
- b. An instruction contains one bit to indicate the addressing mode.
- c. An instruction contains an opcode (Operation Code) that specifies the operation for that instruction.
- d. An instruction contains one or more bits to indicate whether there is an interrupt or not X

1	1	0	0	0	0	T1
1	1	0	1	1	0	T2
1	1	0	1	1	0	T2

Question 2

Correct

3.00 points out of 3.00

Flag question

Which one of the following statements is WRONG?

- a. Datapath unit uses the external inputs to determine the sequence of command signals X
- b. An internal feedback path from the datapath unit to the control unit provides status conditions
- c. Datapath unit manipulates data in registers according to the system's requirements
- d. Control unit issues a sequence of commands to the datapath unit

Your answer is correct.

The correct answer is:

Datapath unit uses the external inputs to determine the sequence of command signals

Question 3
Correct
3.00 points out of 3.00
 Flag question

Which one of the following is wrong for a computer instruction in the Basic Computer designed by Mano?

- a. An instruction contains an address that specifies the registers and/or locations in memory to use for the operation defined in the instruction.
- b. An instruction contains one bit to indicate the addressing mode.
- c. An instruction contains an opcode (Operation Code) that specifies the operation for that instruction.
- d. An instruction contains one or more bits to indicate whether there is an interrupt or not



Your answer is correct.
110000 T1
110110 T2
110110 T2

Question 2
Correct
3.00 points out of 3.00
 Flag question

Which one of the following statements is **WRONG**?

- a. Datapath unit uses the external inputs to determine the sequence of command signals
- b. An internal feedback path from the datapath unit to the control unit provides status conditions
- c. Datapath unit manipulates data in registers according to the system's requirements
- d. Control unit issues a sequence of commands to the datapath unit



Your answer is correct.
The correct answer is:
Datapath unit uses the external inputs to determine the sequence of command signals

Question 3
Correct
3.00 points out of 3.00
 Flag question

Which one of the following is wrong for a computer instruction in the Basic Computer designed by Mano?

- a. An instruction contains an address that specifies the registers and/or locations in memory to use for the operation defined in the instruction.
- b. An instruction contains one bit to indicate the addressing mode.
- c. An instruction contains an opcode (Operation Code) that specifies the operation for that instruction.
- d. An instruction contains one or more bits to indicate whether there is an interrupt or not



Your answer is correct.
The correct answer is:
addition

Question 9
Correct
3.00 points out of 3.00
 Flag question

Control unit gives output as

- a. metadata X
- b. command signals
- c. operation
- d. data X



Your answer is correct.
The correct answer is:
command signals

Question 10
Correct
3.00 points out of 3.00
 Flag question

Which one of the choices explains the following memory operation?

$M[AR] \leftarrow R3$

- a. Write the content of the memory word specified by the address in AR into register R3 X
- b. Write the content of register R3 into the memory word specified by the address in AR ✓
- c. Read memory word specified by the address in AR into register R3 X
- d. Read memory words specified by the address in R3 and by the address in AR3 X



Your answer is correct.
The correct answer is:

Write the content of register R3 into the memory word specified by the address in AR

Question 11
Correct
3.00 points out of 3.00
 Flag question

The operations on the data in registers are called

- a. Assembly code

Flag question

- a. Assembly code
- b. Macrooperations
- c. Microoperations
- d. Instructions



Your answer is correct.

The correct answer is:
Microoperations

Question 12

Correct

3.00 points out of 3.00

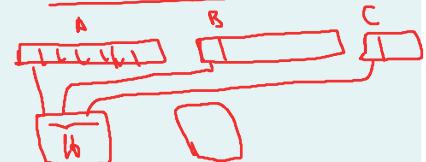
Flag question

A digital computer has a common processor bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.

- i. How many selection inputs are there in each multiplexer?
- ii. What size of multiplexers are needed?
- iii. How many multiplexers are there in the bus?

- a. 32, 16x1, 4
- b. 16, 4x1, 32
- c. 4, 16x1, 32
- d. 16, 32x1, 4

16x1
32



Your answer is correct.

The correct answer is:

4, 16x1, 32

Question 13

Correct

3.00 points out of 3.00

Flag question

A computer uses a memory unit with 256K words (locations) of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers and an address part.

- a. 17, 6, 8
- b. 7, 6, 3
- c. 2, 6, 8
- d. 7, 6, 18

2⁸ 2⁵ 32
2⁴ → 2⁵ 8
2⁷ 5



Your answer is correct.

The correct answer is: 7, 6, 18

Question 14

Incorrect

0.00 points out of 3.00

Flag question

You have a 64K x 16 RAM, created from two 64K x 8 RAM chips. Assume that one of the chips does not operate correctly (i.e. you cannot read what you have written to it). Which of the following statements is true?

- a. None of the data words contain valid data.
- b. Half of the data words becomes inaccessible.
- c. All data words are accessible but only half of them contains valid data.
- d. Half of the data words are accessible and they contain valid data.

○ ○



Your answer is incorrect.

The correct answer is: None of the data words contain valid data.

Question 15

Correct

3.00 points out of 3.00

Flag question

Which one of the choices represents the following conditional control statement by two register transfer statements with control functions?

If (P = 1) then (R1 <- R2) else if (Q = 1) then (R1 <- R3)

- a. P: R1 <- R3
 Q: R1 <- R2
- b. P: R1 <- R2
 PQ: R1 <- R3
- c. P: R1 <- R3
 Q: R1 <- R2
- d. P: R1 <- R2
 P'Q: R1 <- R3

✓



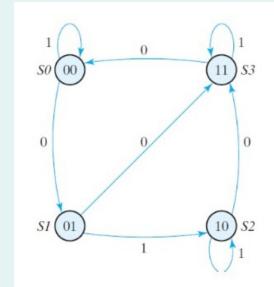
Your answer is correct.

The correct answer is:

P: R1 <- R2
P'Q: R1 <- R3

Question 10
Correct
4.00 points out of 4.00
 Flag question

Below is the state diagram of a sequential circuit having two D flip-flops, A and B, and one input x. What are the simplified flip-flop input equations of the circuit, i.e. D_A and D_B ?



$$\begin{array}{c}
 \begin{array}{cc} PA & PB \end{array} \\
 \begin{array}{c} 00 \\ 00 \\ 00 \\ 01 \\ 01 \\ 10 \\ 10 \\ 10 \\ 11 \\ 11 \\ 11 \end{array} \quad \begin{array}{c} 0 \\ 1 \\ 0 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 0 \\ 1 \\ 1 \end{array} \\
 \begin{array}{c} AB \\ \downarrow \\ 00 \ 01 \ 11 \ 10 \end{array} \\
 \begin{array}{c} A'B + AB' + Bx \end{array}
 \end{array}$$

- a. $D_A = A' + B' + Bx$ $D_B = B'x' + A'x'$
- b. $D_A = A'B' + AB$ $D_B = B'x' + A'x' + ABx'$
- c. $D_A = AB' + A'B + Bx$ $D_B = B'x' + A'x' + ABx$
- d. $D_A = AB' + A'B$ $D_B = x'(A' + B') + ABx'$

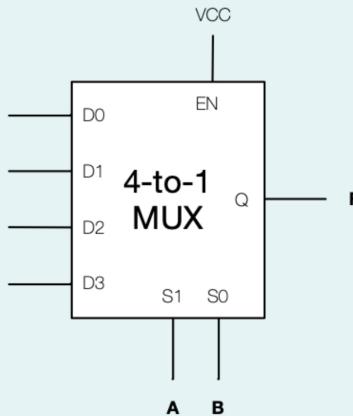
Your answer is correct.

The correct answer is:

$$D_A = AB' + A'B + Bx \quad D_B = B'x' + A'x' + ABx$$

Question 17
Correct
4.00 points out of 4.00
 Flag question

Give expressions for the following 4-to-1 MUX inputs to implement the circuit defined by $F(A,B,C,D) = \Sigma(0,5,6,7,11)$.



- a. $D_0 = C'D'$ $D_1 = C+D$
 $D_2 = CD$
 $D_3 = 0$
- b. $D_0 = 0$
 $D_1 = C+D$
 $D_2 = CD$
 $D_3 = C'D'$
- c. $D_0 = 0$
 $D_1 = CD$
 $D_2 = C+D$
 $D_3 = C'D'$
- d. $D_0 = C'D'$
 $D_1 = CD$
 $D_2 = C+D$
 $D_3 = 0$

$$\begin{array}{c}
 \begin{array}{cc} C & D \end{array} \\
 \begin{array}{c} 00 \\ 00 \\ 00 \\ 01 \\ 01 \\ 10 \\ 10 \\ 10 \\ 11 \\ 11 \\ 11 \end{array} \quad \begin{array}{c} 0 \\ 1 \\ 0 \\ 0 \\ 1 \\ 0 \\ 1 \\ 0 \\ 0 \\ 1 \\ 1 \end{array} \\
 \begin{array}{c} F \\ \downarrow \\ 00 \ 01 \ 11 \ 10 \end{array} \\
 \begin{array}{c} C+D \end{array}
 \end{array}$$

Your answer is correct.

The correct answer is:

$$\begin{aligned}
 D_0 &= C'D' \\
 D_1 &= C+D \\
 D_2 &= CD \\
 D_3 &= 0
 \end{aligned}$$

Question 18

Correct

3.00 points out of 3.00

Flag question

Which one of the following is NOT a microoperation?

- a. Load ✓
- b. Add ✓
- c. Shift ✓
- d. Carry



Your answer is correct.

The correct answer is:

Carry

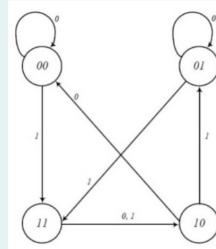
Question 19

Correct

4.00 points out of 4.00

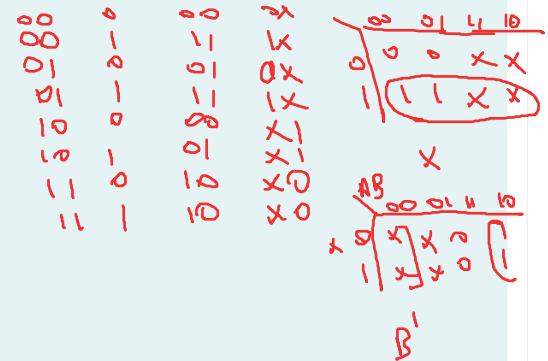
Flag question

The function of a sequential circuit having two JK-FFs (A and B) and one input x is described by the circuit diagram below. Find out the simplified flip-flop input equations, i.e. J_A , K_A , J_B , and K_B .

**Table 5.12**

$Q(t)$	$Q(t+1)$	J	K
0	0	0	X
0	1	1	X
1	0	X	1
1	1	X	0

(a) JK

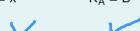


- a. ~~$J_A = BX$~~ $K_A = x'$ $J_B = B'x$ $K_B = A$

- b. $J_A = x$ ~~$K_A = B'$~~ $J_B = x'$ $K_B = AB$

- c. $J_A = x'$ ~~$K_A = B'$~~ $J_B = x'$ $K_B = AB$

- d. $J_A = x$ $K_A = B'$ $J_B = x$ $K_B = A$



Your answer is correct.

The correct answer is:

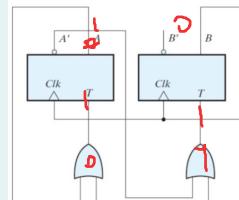
 $J_A = x \quad K_A = B' \quad J_B = x \quad K_B = A$ **Question 20**

Correct

4.00 points out of 4.00

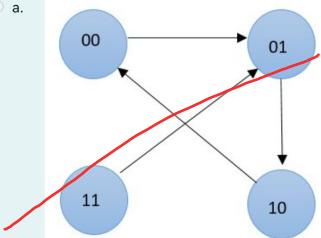
Flag question

Given the circuit diagram below, find out the state diagram of the sequential circuit. Please note that alphabetical order is followed when representing the states (i.e. A B).

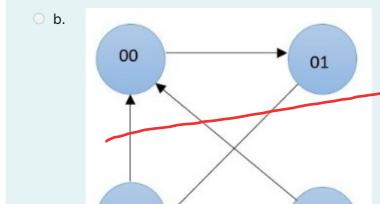
**T Flip-Flop**

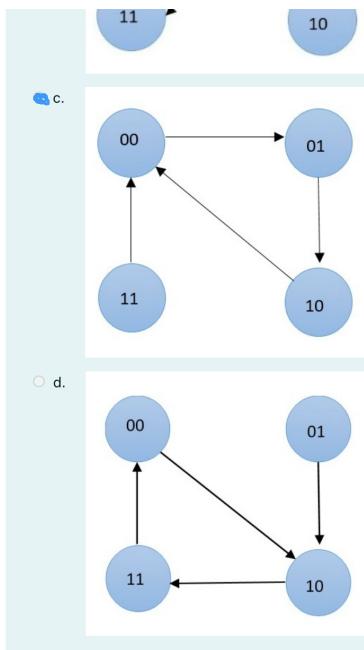
T	$Q(t+1)$
0	$Q(t)$
1	$Q'(t)$

- a.



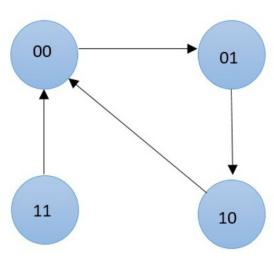
- b.





Your answer is correct.

The correct answer is:



Question 21

Incorrect

0.00 points out of 3.00

Flag question

Which of the following is correct regarding PAL and PLA?

- a. PAL has a fixed AND plane and a programmable OR plane.
- b. PAL is re-programmable version of a PLA.
- c. PAL has more possible product terms than the PLA.
- d. PLA has a programmable OR plane and a programmable AND plane.

PLA programs AND, OR
PAL programs AND, fixed OR

✓

Your answer is incorrect.

The correct answer is:

PLA has a programmable OR plane and a programmable AND plane.

Question 22

Incorrect

0.00 points out of 3.00

Flag question

During the execution of a program, which of the following registers does get initialized first in the Basic Computer designed by Mano?

- a. PC
- b. AR
- c. DR
- d. IR



✗

Your answer is incorrect.

The correct answer is:

PC

Question 23

Correct

3.00 points out of 3.00

Flag question

In Basic Computer, which of the following is NOT a part of the machine instruction cycle?

- a. Decode the instruction ✓
- b. Read the effective address from memory if the instruction has a direct address
- c. Fetch an instruction from memory ✓
- d. Execute the instruction ✓

✓

Your answer is correct.

$$\begin{aligned}B(t+1) &= A(t) \cup(t) + B(t) \cup(t)' \\C(t+1) &= A(t)' B(t) + A(t) B(t)\end{aligned}$$

Your answer is correct.

The correct answer is:

$$\begin{aligned}A(t+1) &= A(t) C(t) + B(t) C(t)' \\B(t+1) &= A(t)' C(t) + B(t) C(t)' \\C(t+1) &= A(t)' B(t)' + A(t) B(t)\end{aligned}$$

Question 28

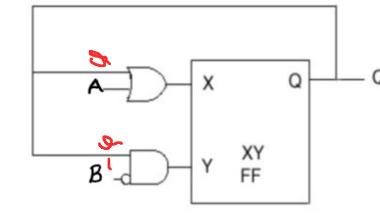
Correct

4.00 points out of 4.00

Flag question

An XY flip-flop is a device with two inputs, X and Y, such that when $X=Y=0$, the next state is 0. When $X=Y=1$ the next state is 1. When $X \neq Y$ the next state is the complement of the present state of the flip-flop.

Assume we design the following two-input AB flip-flop using an XY flip-flop and additional combinational logic. What kind of FF is AB flip-flop?



A	B	\bar{A}	\bar{B}	K	\bar{Y}	Y	\bar{Q}	Q
0	0	1	1	0	0	1	1	0
0	0	1	1	1	1	0	0	1
0	1	1	0	0	0	1	1	0
0	1	1	0	1	1	0	0	1
1	0	0	1	0	1	0	1	1
1	0	0	1	1	0	1	0	0
1	1	0	0	1	0	1	1	0
1	1	0	0	0	0	0	0	1

- a. T flip-flop
- b. D flip-flop
- c. J-K flip-flop
- d. S-R flip-flop



Your answer is correct.

The correct answer is: J-K flip-flop

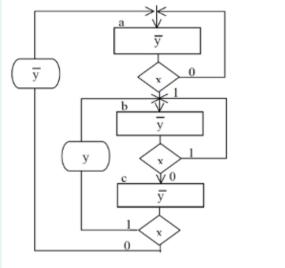
Question 29

Correct

4.00 points out of 4.00

Flag question

Assume that the ASMD chart indicated below is given. Which of the following choices is the corresponding state diagram for the controller?

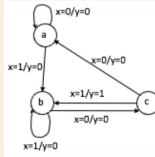


- a.
- b.
- c.
- d.



Your answer is correct.

The correct answer is:



Question 30

Correct

4.00 points out of 4.00

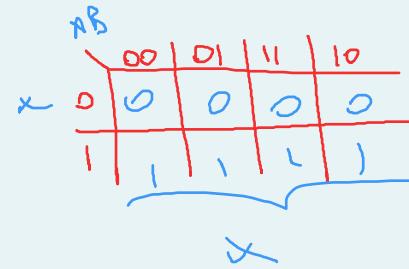
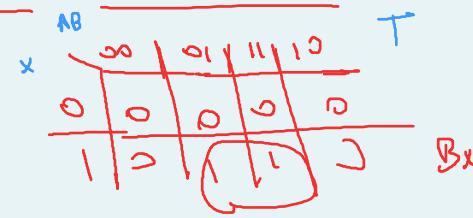
Flag question

Below is the state table of a sequential circuit having two T flip-flops (A and B), one input x, and one output y. What are the simplified equations of flip-flop inputs (T_A and T_B) and output (y) ?

Table 5.5
State Table for Sequential Circuit with T Flip-Flops

Present State		Input	Next State		Output
A	B	x	A	B	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	0	1	0
0	1	1	1	0	0
1	0	0	1	0	0
1	0	1	1	1	0
1	1	0	0	1	1
1	1	1	1	0	1

- a. $T_A = B$ $T_B = x'$ $y = AB$
- b. $T_A = Bx$ $T_B = x$ $y = AB$
- c. $T_A = Bx$ $T_B = x'$ $y = (AB)'$
- d. $T_A = B'x$ $T_B = x$ $y = A'B'$



Your answer is correct.

The correct answer is: $T_A = Bx$ $T_B = x$ $y = AB$

Finish review

◀ Rules-and-regulations-for-final

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Lab Final Exam ▶

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CENG 232- All Sections

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