NATIONAL UNIVERSITY OF SINGAPORE

CS2100 – COMPUTER ORGANISATION

(Semester 2: AY2018/19)

ANSWER BOOKLET

Time Allowed: 2 Hours

INSTRUCTIONS TO CANDIDATES

1. This answer booklet consists of **SIX (6)** printed pages.

2. Fill in your Student Number **with a pen clearly** below. Do <u>NOT</u> write your name.

3. You may write your answers in pencil (2B or above).

STUDENT NUMBER
(fill in with a <u>pen</u>):

A	0							

For examiner's use only		
Question	*Total*	*Marks*
Q1	12	
Q2	4	
Q3	14	
Q4	16	
Q5	22	
Q6	18	
Q7	14	
Total	**100**	

Write your answers in the box/space provided.

1a.
[2]

$t0 =

$t1 =

1b.
[2]

1c.
[2]

1d.
[2]

1e.
[2]

1f.
[2]

Q1: /12

2.
[4]

Q2: /4

3a.
[2]

3b.
[3]

3c. [3]
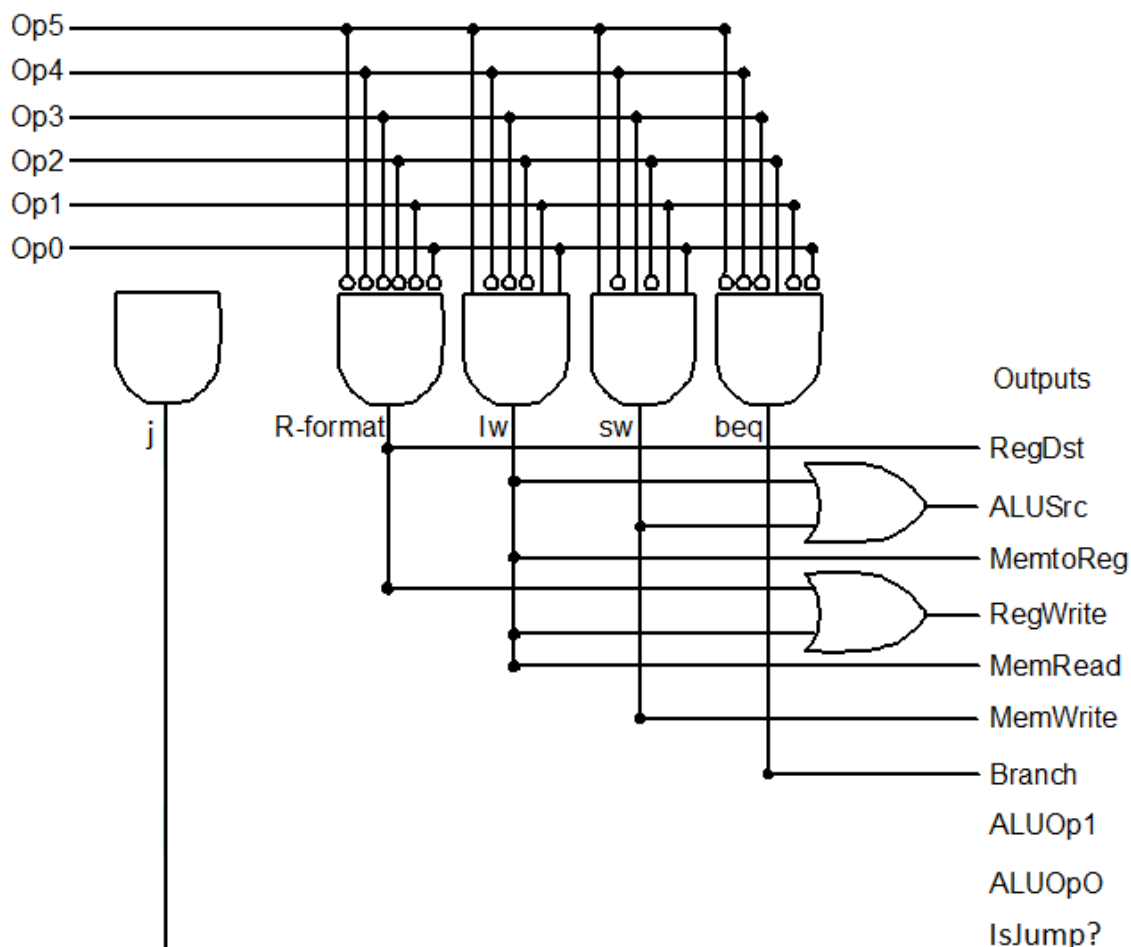
	RegDst	ALUSrc	MtoR	Reg Write	Mem Read	Mem Write	Branch	IsJump?	ALUop	
									Op1	Op0
R-type	1	0	0	1	0	0	0		1	0
lw	0	1	1	1	1	0	0		0	0
sw	X	1	X	0	0	1	0		0	0
beq	X	0	X	0	0	0	1		0	1
j										

3d. [4]

Inputs

3e.
[2]

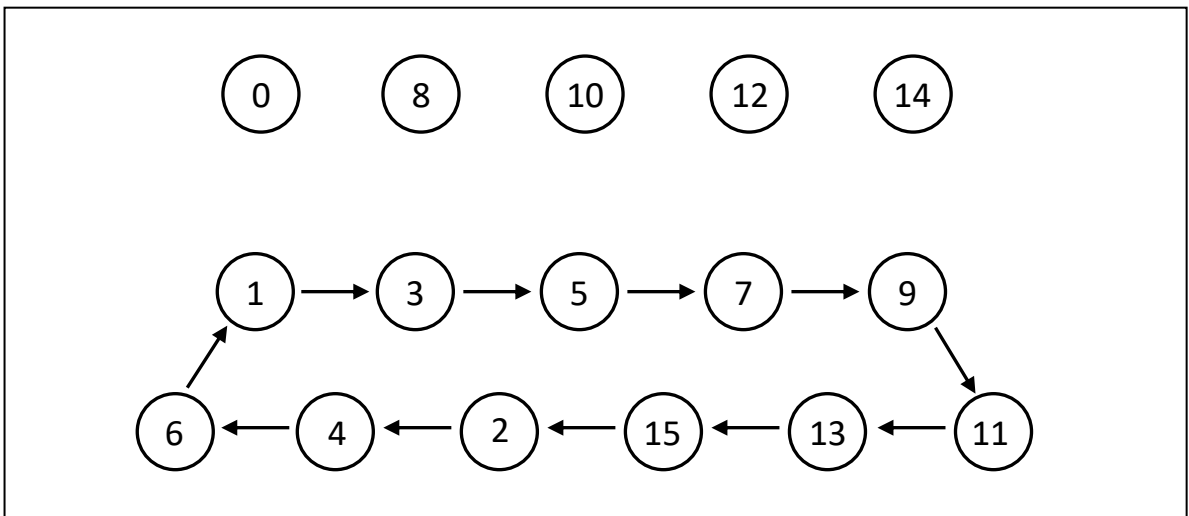Q3: /14

4a.
[10]

DA =

TB =

TC =

JD =

KD =

4b.
[5]

4c.
[1]

Is the circuit self-correcting? Why?

Q4: /16

5a.
[3]

Count-1

0	
1	
2	F_3
3	F_2
4	F_1
5	F_0
6	
7	

5b.
[3]

Count-1

A	0	
B	1	
C	2	F_3
D	3	F_2
E	4	F_1
F	5	F_0
G	6	
H	7	

5c.
[4]

5d.
[6]

4:1
MUX

0
1
2
3

R

0

1
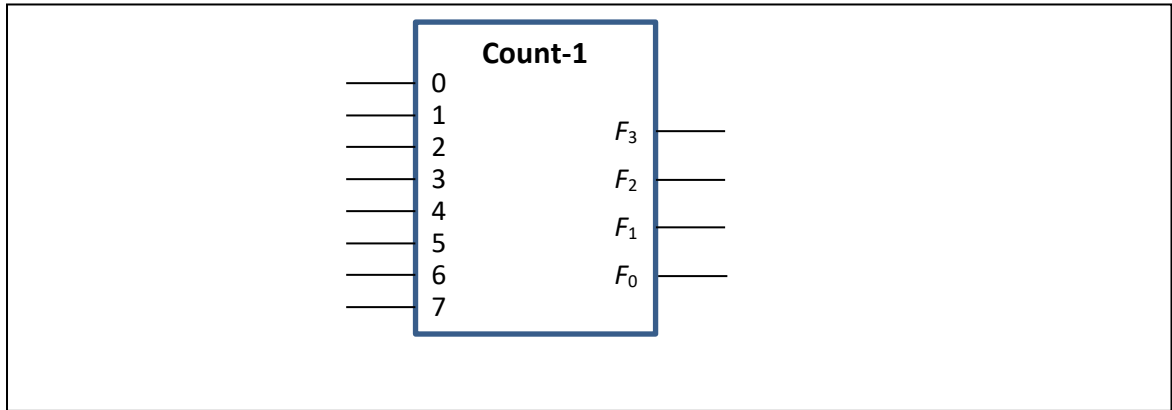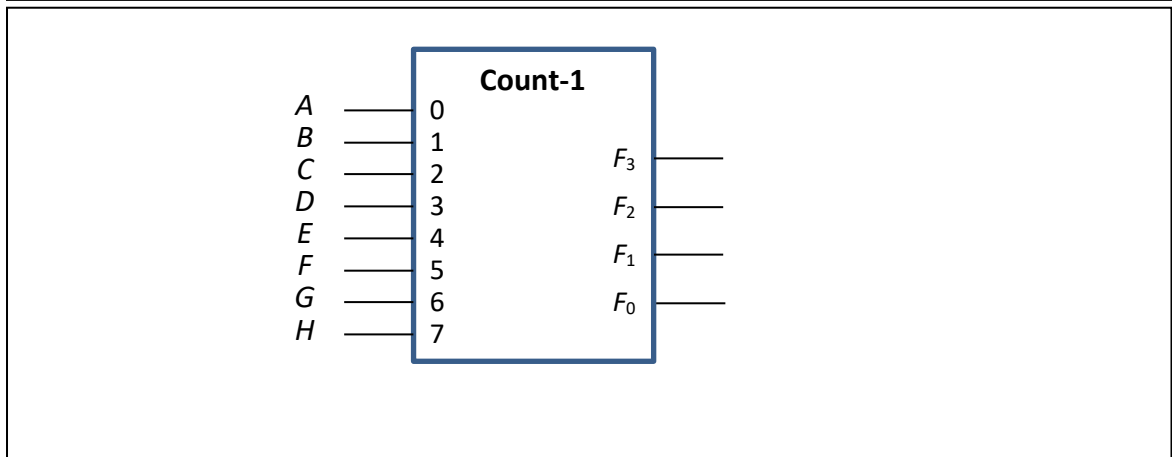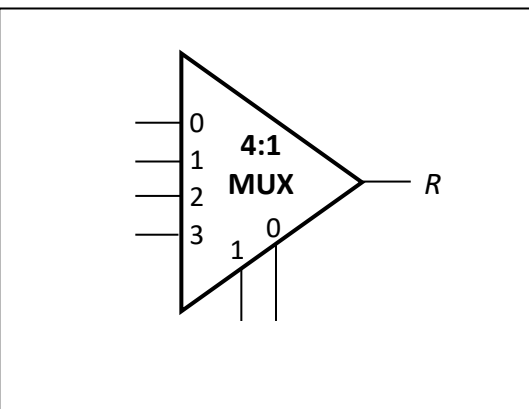
5e.
[6]

$X =$

$Y =$

$Z =$

Q5: /22

6a.
[2]

Set index: _____ bits;   Offset: _____ bits

6b.
[3]

A[0] → Set _____; B[60] → Set _____; C[1032] → Set _____

6c.
[6]

Hit rate for array A: _____;   array B: _____;   array C: _____

6d.
[2]

Number of misses in first iteration: _____

6e.
[2]

Number of misses in second iteration: _____

6f.
[3]

Total number of misses: _____

Q6: _____ /18

7a.
[2]

7b.
[3]

Without forwarding/branch decision at MEM stage

_____ cycles

7c.
[3]

With forwarding/early branching/no branch prediction

_____ cycles

7d.
[3]

With forwarding/early branching/branch predicted not taken

_____ cycles

7e.
[3]

Q7: _____ /14

=== END OF PAPER ===