higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

LOGIC SYSTEMS N5

25 NOVEMBER 2016

This marking guideline consists of 7 pages.

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QUESTION 1

					Λ		Λ		Λ		Λ
A	**B**	**C**	**D**	**J_A**	**K_A**	**J_B**	**K_B**	**J_C**	**K_C**	**J_D**	**K_D**
0	0	0	0	0	Ø	0	Ø	0	Ø	1	Ø
0	0	0	1	0	Ø	0	Ø	1	Ø	Ø	1
0	0	1	0	0	Ø	0	Ø	Ø	0	1	Ø
0	0	1	1	0	Ø	1	Ø	Ø	1	Ø	1
0	1	0	0	0	Ø	Ø	0	0	Ø	1	Ø
0	1	0	1	0	Ø	Ø	0	1	Ø	Ø	1
0	1	1	0	0	Ø	Ø	0	Ø	0	1	Ø
0	1	1	1	1	Ø	Ø	1	Ø	1	Ø	1
1	0	0	0	Ø	1	0	Ø	0	Ø	0	Ø
1	0	0	1	Ø	1	0	Ø	0	Ø	Ø	1
1	0	1	0	Ø	1	0	Ø	Ø	1	0	Ø
1	0	1	1	Ø	1	0	Ø	Ø	1	Ø	1
1	1	0	0	Ø	1	Ø	1	0	Ø	0	Ø
1	1	0	1	Ø	1	Ø	1	0	Ø	Ø	1
1	1	1	0	Ø	1	Ø	1	Ø	1	0	Ø
1	1	1	1	Ø	1	Ø	1	Ø	1	Ø	1

$Q_n \rightarrow Q_{n+1}$	J	K
0 → 0	0	Ø
0 → 1	1	Ø
1 → 0	Ø	1
1 → 1	Ø	0

Λ = 1/2 mark

J_A =BCD Λ

	00	01	11	10	
00	0	0	Ø	Ø	
01	0	0	Ø	Ø	Λ
11	0	1	Ø	Ø	
10	0	0	Ø	Ø	Λ

K_A = 1 Λ

	00	01	11	10	
00	Ø	Ø	1	1	
01	Ø	Ø	1	1	
11	Ø	Ø	1	1	
10	Ø	Ø	1	1	Λ

J_B ='ACD Λ

	00	01	11	10	
00	0	Ø	Ø	0	
01	0	Ø	Ø	0	
11	1	Ø	Ø	0	
10	0	Ø	Ø	0	Λ

K_B = A+CD Λ

	00	01	11	10	
00	Ø	0	1	Ø	
01	Ø	0	1	Ø	
11	Ø	1	1	Ø	
10	Ø	0	1	Ø	Λ

J_C ='AD Λ

	00	01	11	10	
00	0	0	0	0	
01	1	1	0	0	
11	Ø	Ø	Ø	Ø	
10	Ø	Ø	Ø	Ø	Λ

K_C =A+D Λ

	00	01	11	10	
00	Ø	Ø	Ø	Ø	
01	Ø	Ø	Ø	Ø	
11	1	1	1	1	
10	0	0	1	1	Λ

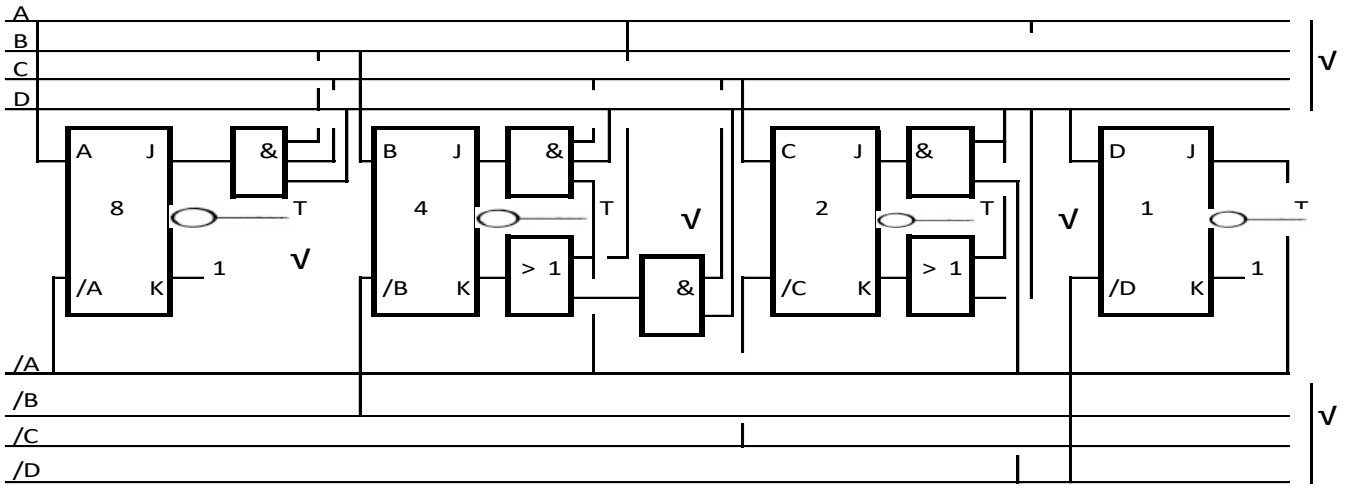
J_D ='A Λ

	00	01	11	10	
00	1	1	0	0	
01	Ø	Ø	Ø	Ø	
11	Ø	Ø	Ø	Ø	
10	1	1	0	0	Λ

K_D = 1 Λ

	00	01	11	10	
00	Ø	Ø	Ø	Ø	
01	1	1	1	1	
11	1	1	1	1	
10	Ø	Ø	Ø	Ø	Λ

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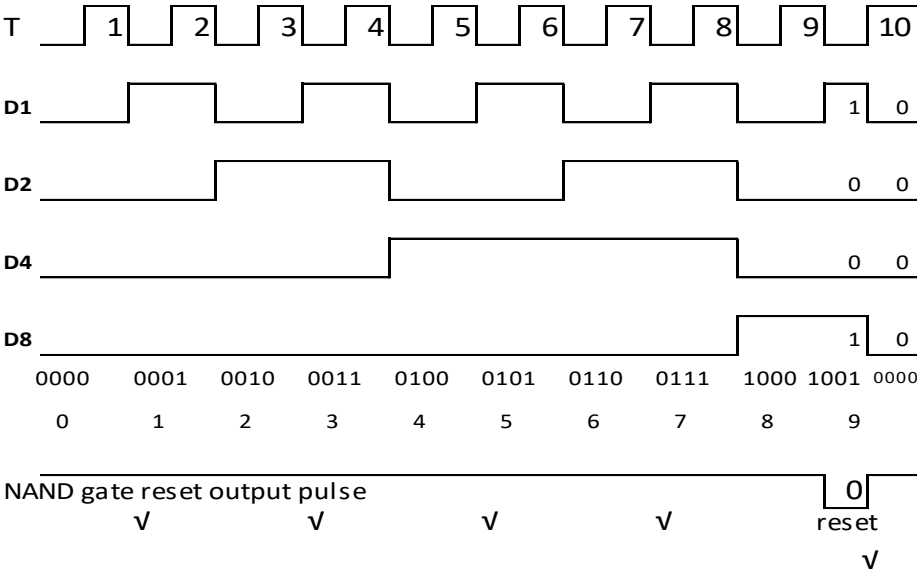


√ √ √ √ √

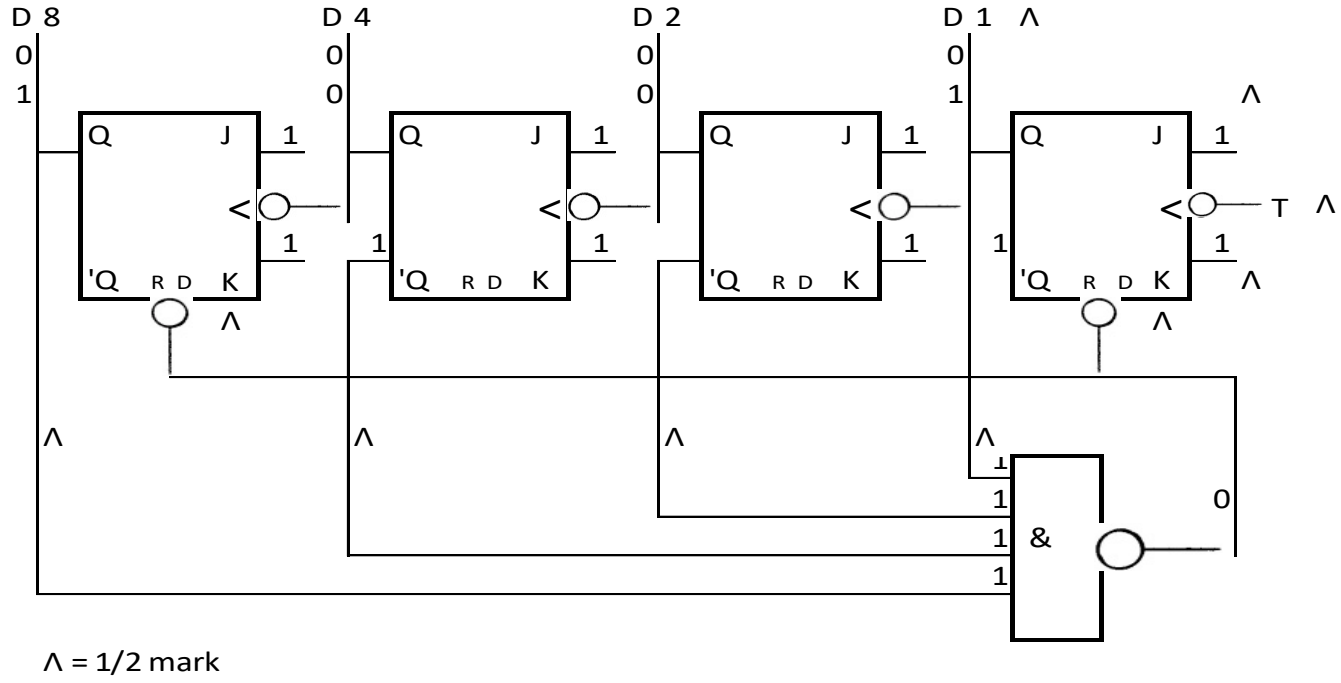
[15]

QUESTION 2

D8	D4	D2	D1	T	
0	0	0	0	0	
0	0	0	1	1	√
0	0	1	0	2	
0	0	1	1	3	√
0	1	0	0	4	
0	1	0	1	5	√
0	1	1	0	6	
0	1	1	1	7	
1	0	0	0	8	√
1	0	0	1	9	
0	0	0	0	9	√



√ √ √ √ √

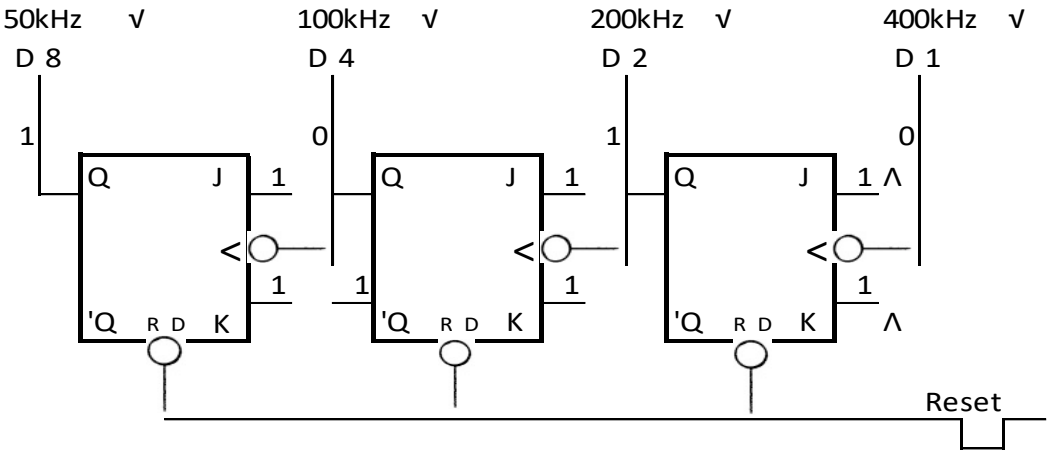


Λ = 1/2 mark

[15]

QUESTION 3

3.1



(5)

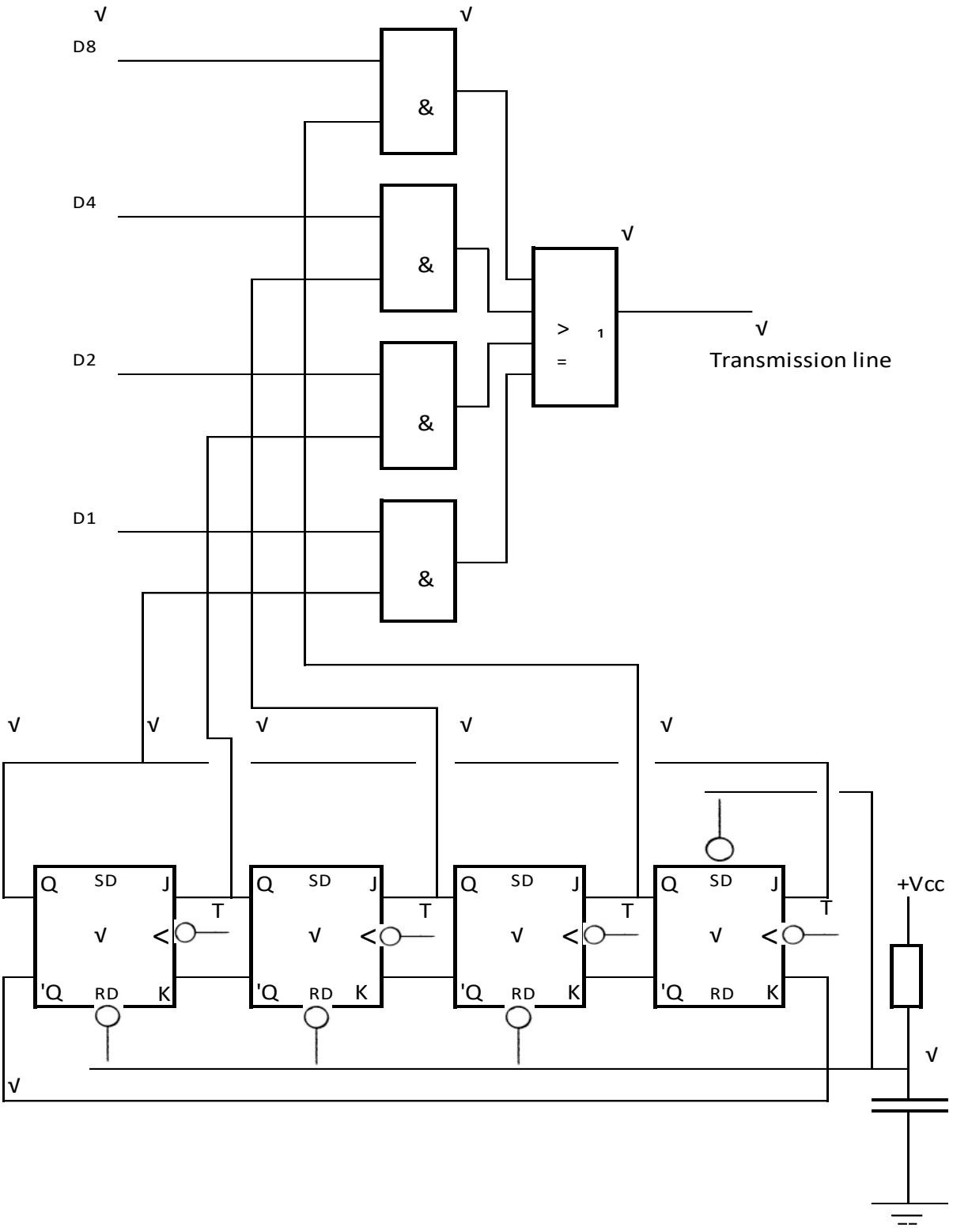
3.2 400/50 = 8 = 2^3 therefore 3 flip-flops are required.

OR

Each flip-flop divides its clock input frequency by 2, therefore 3 flip-flops are required. (5)

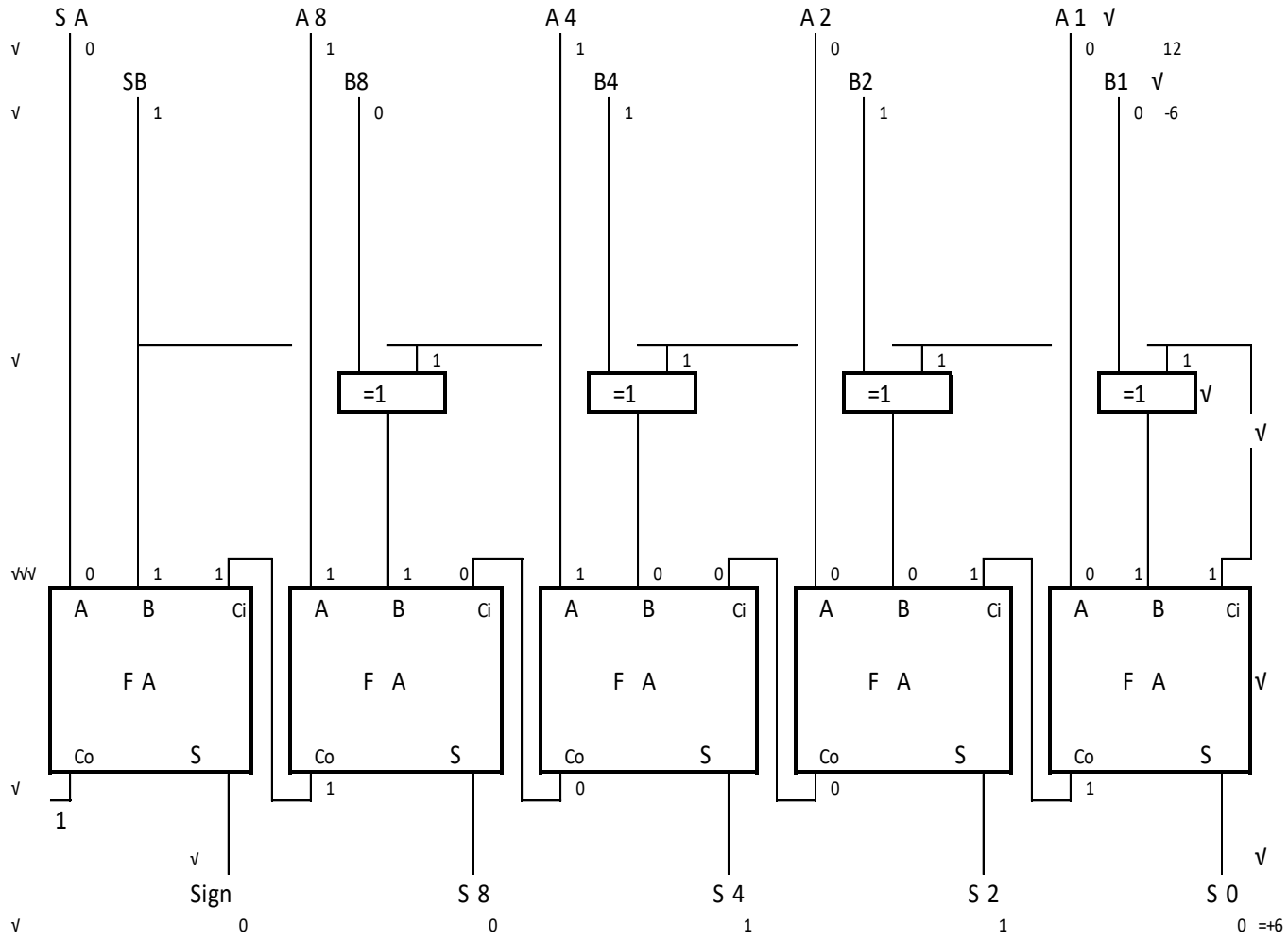
[10]

QUESTION 4



[15]

QUESTION 5



8 marks for logic levels
7 marks for circuit

[15]

QUESTION 6

6.1 The computer stores the program instructions
and data in the SRAM or DRAM
when the computer is running.
When the computer is not running
the program instructions and data are stored in the hard drive. (5)

6.2	6.2.1	D
	6.2.2	F
	6.2.3	I
	6.2.4	H
	6.2.5	C
	6.2.6	A
	6.2.7	B
	6.2.8	J
	6.2.9	E
	6.2.10	G

(10 × 1) (10)
[15]

QUESTION 7

7.1	Print
7.2	Impact
7.3	Paper
7.4	Matrix
7.5	Rod
7.6	Electromagnet
7.7	Character
7.8	Spins
7.9	Character
7.10	Hammer
7.11	Presses
7.12	Character
7.13	Chain
7.14	Hammer
7.15	Character

(15 x 1) **[15]**

TOTAL: 100

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