



UNIVERSITI KUALA LUMPUR
MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION
JANUARY 2014 SESSION

SUBJECT CODE	: FLD 20403
SUBJECT TITLE	: DIGITAL SYSTEM
LEVEL	: DIPLOMA
DURATION	: 2 HOURS 3.00 pm - 5.00 pm
DATE / TIME	: 0 6 JUN 2014

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answers should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of **TWO (2) sections**. Section A and B. Answer all questions in Section A. For Section B, answer two (2) questions only.
6. Answer all questions in English.

THERE ARE 6 PRINTED PAGES OF QUESTIONS, EXCLUDING THIS PAGE & APPENDIX.

SECTION A (Total: 60 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) Convert the binary numbers to decimal.
- (i) 10010 (2 marks)
 - (ii) 0.011 (2 marks)
 - (iii) 10111.10 (2 marks)
 - (iv) 1111.10 (2 marks)
- (b) Convert the following numbers.
- (i) 111100011 to Hex (2 marks)
 - (ii) 23d to binary (2 marks)
 - (iii) 110101101 to Hex (2 marks)
 - (iv) ed8c to binary (2 marks)
- (c) Decode the following ASCII message.
- 476f2c2055544420436f6d65747321
- (2 marks)
- (d) Solve the problems below in 2's complement numbers.
- (i) Compute $0101\ 0101 + 1011\ 0110$. Show your work. (1 mark)
 - (ii) Compute $1111\ 1100 - 0101\ 0001$. Show your work. (1 mark)

Question 2

For the truth table **Table 1** below,

- (a) Write Boolean expression in POS form. (2 marks)
- (b) Write Boolean expression in SOP form. (2 marks)
- (c) Summarize the Boolean expression of SOP form using Karnaugh map. (4 marks)
- (d) Draw the original SOP form circuit. (2 marks)
- (e) Draw the simplified SOP form circuit. (2 marks)
- (f) Draw the original POS form circuit. (2 marks)
- (g) Replace all the gates in the simplified SOP form circuit with NAND gates. (3 marks)
- (h) Replace all the gates in the simplified SOP form circuit with NOR gates. (3 marks)

Table 1

X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

Question 3

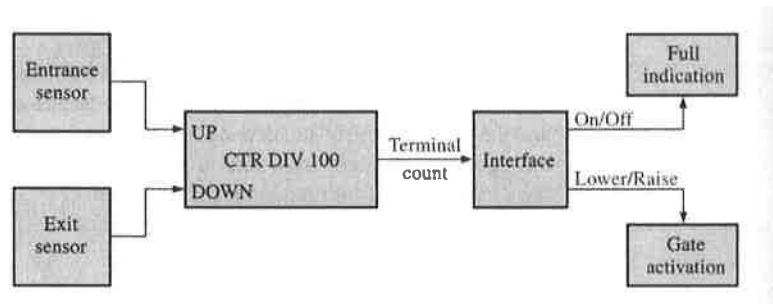
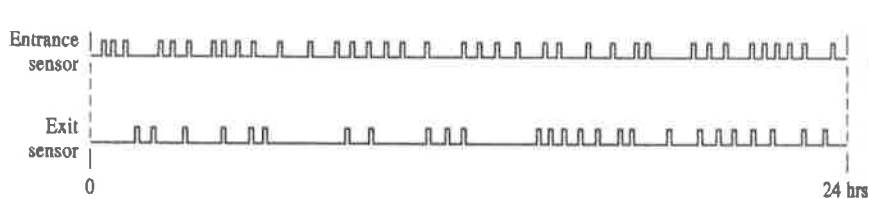
Answer the following question on flip flops.

- (a) Show the truth table for clocked SR type flip flop. (4 marks)
- (c) Show the truth table for clocked D type flip flop. (4 marks)
- (d) Construct a circuit clocked D type flip flop (2 marks)
- (f) Show the truth table for clocked JK type flip flop. (4 marks)
- (g) Show the truth table for clocked T type flip flop. (2 marks)
- (h) Construct a circuit clocked T type flip flop. (2 marks)

SECTION B (Total: 40 marks)**INSTRUCTION: Answer TWO (2) questions only****Please use the answer booklet provided.****Question 4**

Figure 1 shows a functional diagram of an automobile parking control system. A pattern of entrance and exit sensor pulses during a given 24-hour period are shown in the diagram. There were 53 cars already in the garage at the beginning of the period.

- Determine the state of the counter at the end of the 24 hours and define "CTR DIV 100". (4 marks)
- Draw an asynchronous up counter circuit for three JK flip flop. (4 marks)
- Draw a synchronous up counter circuit for three JK flip flop. (4 marks)
- Draw an asynchronous down counter circuit for three JK flip flop. (4 marks)
- Draw a synchronous down counter circuit for three JK flip flop. (4 marks)

**Automobile Parking Control system****Entrance/Exit Sensor Pulses During A 24 Hour Period****Figure 1**

Question 5

Change the following expressions into standard form using Boolean algebra:

(a) $F = (A+Y)(\overline{A}+Y+Z)$ (4 marks)

(b) $F = A\overline{B} + \overline{A}B\overline{C} + \overline{A}\overline{B}C$ (4 marks)

(c) $F = (AB + \overline{A}C)(C+AB)$ (4 marks)

(d) $F = \overline{A}\overline{B}\overline{C}D + A\overline{B}\overline{C}D + A\overline{D}$ (4 marks)

(e) $F = (B+\overline{C})(\overline{A}+B+\overline{C})$ (4 marks)

Question 6

Refer from **Figure 2**,

- (a) Complete the timing diagram for this circuit, assuming all Q outputs begin in the low state.

(10 marks)

- (b) State 6 types of shift register.

(6 marks)

- (c) State the comparison between Ring and Johnson counter.

(4 marks)

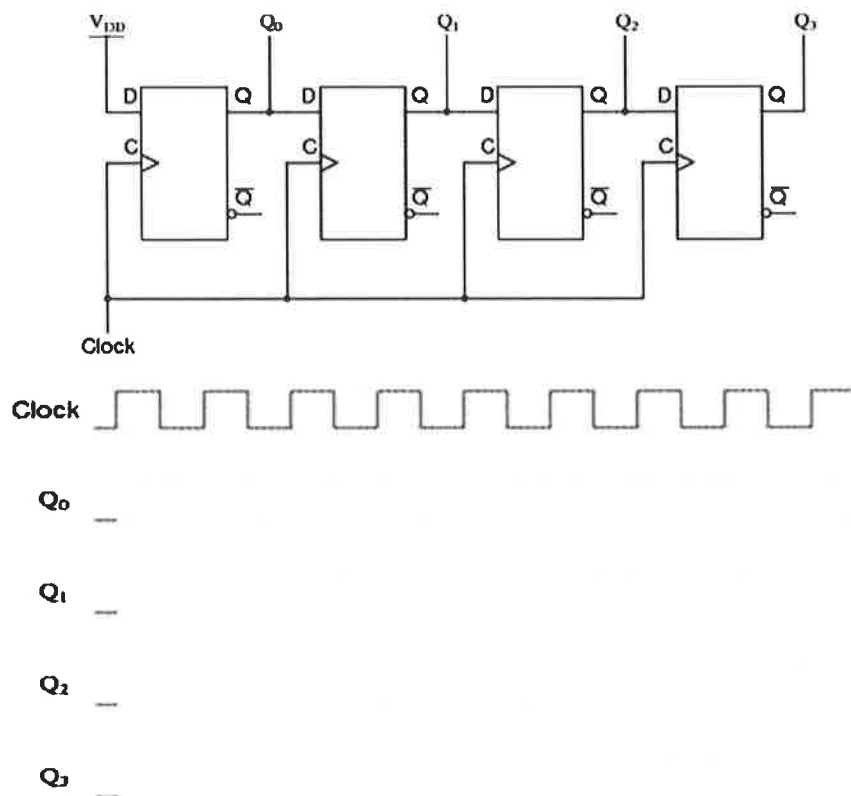


Figure 2

END OF QUESTION PAPER

Appendix

ASCII CODE Table

	000	001	010	011	100	101	110	111
0000	NULL	DLE		0	@	P		p
0001	SOH	DC1	!	1	A	Q	a	q
0010	STX	DC2	"	2	B	R	b	r
0011	ETX	DC3	#	3	C	S	c	s
0100	EDT	DC4	\$	4	D	T	d	t
0101	ENQ	NAK	%	5	E	U	e	u
0110	ACK	SYN	&	6	F	V	f	v
0111	BEL	ETB	'	7	G	W	g	w
1000	BS	CAN	(	8	H	X	h	x
1001	HT	EM	)	9	I	Y	i	y
1010	LF	SUB	*	:	J	Z	j	z
1011	VT	ESC	+	;	K	[	k	{
1100	FF	FS	,	<	L	\	l	|
1101	CR	GS	-	=	M	]	m	}
1110	SO	RS	.	>	N	^	n	~
1111	SI	US	/	?	O	_	o	DEL

BOOLEAN THEOREMS

- | | | |
|---------------------------------|---|--|
| 1. $X \bullet 0 = 0$ | 8. $X + \overline{X} = 1$ | 14. $X + XY = X$ |
| 2. $X \bullet 1 = X$ | 9. $X + Y = Y + X$ | 15. $X + \overline{X}Y = X + Y$ |
| 3. $X \bullet X = X$ | 10. $X \bullet Y = Y \bullet X$ | 16. $\overline{X + Y} = \overline{X} \overline{Y}$ |
| 4. $X \bullet \overline{X} = 0$ | 11. $X + (Y + Z) = (X + Y) + Z = X + Y + Z$ | 17. $\overline{XY} = \overline{X} + \overline{Y}$ |
| 5. $X + 0 = X$ | 12. $X(YZ) = (XY)Z = XYZ$ | 18. $\overline{\overline{A}} = A$ |
| 6. $X + 1 = 1$ | 13a. $X(Y + Z) = XY + XZ$ | |
| 7. $X + X = X$ | 13b. $(W + X)(Y + Z) = WY + XY + WZ + XZ$ | |