School of Computing

UTM UNIVERSITI TEKNOLOGI MALAYSIA

RESEARCH UNIVERSITY

TEST 1 SEMESTER I 2019/2020

SUBJECT CODE	:	**SECR/SCSR1013**
SUBJECT TITLE	:	**DIGITAL LOGIC**
COURSE	:	**SECR/SCSR/J/B/V/P**
TOTAL TIME	:	**1 HOUR 30 MINUTES**
DATE	:	**15 / 10 / 2019 (TUESDAY)**
VENUE	:	**N28 & N28a**

(GENERAL INSTRUCTION):

Answer all questions from Part A and B.

1. Write ALL your answers for Part B in the answer booklet.

2. Answer Part A : Objective Questions on page 7.

3. This test will contribute 15% towards the total marks of 100%.

Warning!!!

Students who are caught cheating during the examination will be reported to the disciplinary board for possible suspension of the student for one or two semesters.

Name	
Metric No	
Year / Course	
Section (Circle)	**01 / 02 / 03 / 04 / 05 / 06 / 07 / 08 / 09**
Lecturer (Circle)	**□ Rashidah bt Kadir □ Zuriahati bt Mohd Yunos □ Firoz bin Yusuf Patel Dawoodi**

This question booklet consists of 7 pages including the front page.

PART A: OBJECTIVE QUESTIONS [Total mark 15 marks]

Read each statement carefully.

1. Which of the following is **TRUE** about counting function?
   I. Allow easy conversion to decimal digits for display and faster computation
   II. Initiating a controller after a certain period
   III. Allow a faster and more efficient data processing
   IV. Counting the occurrence at the input

   A. I and II
   B. II and III
   C. I, III and IV
   D. II and IV

2. Which of the memory devices in Digital Systems that can store volatile current running program?
   A. Flip-flop
   B. Flash
   C. RAM
   D. Registers

3. _____ is a major class of integrated circuits and used in microprocessors, microcontrollers, static RAM and others.
   A. NMOS
   B. TTL
   C. CMOS
   D. ECL

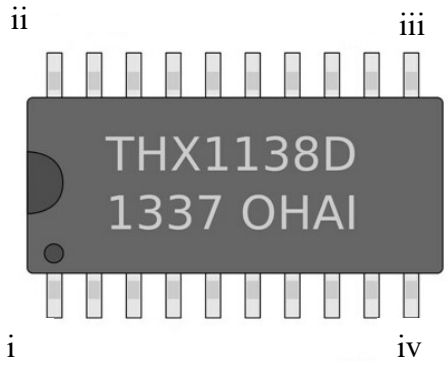
4. Which of the following Boolean gates operation is **TRUE**?
   A. Output of the INVERTER gate will always complement the input state
   B. Output of the AND gate will be HIGH if all inputs are LOW
   C. Output of the OR gate will be HIGH if all inputs are LOW
   D. Output of the AND gate will be LOW if all inputs are HIGH

5. Simple Programmable Logic Device (SPLD) can be categorized into the following types **EXCEPT**
   A. PLA (Programmable Logic Array)
   B. PRAM (Programmable Read Access Memory)
   C. PAL (Programmable Array Logic)
   D. GAL (Generic Array Logic)

6. _____ is the rate at which the signal repeat itself at a fixed interval and is measured in cycles per second.
   A. Pulse width
   B. Frequency
   C. Duty cycle
   D. Period

7. Given the pulse width (t_w) with 300s and a period (T) of a system is 1200s. Calculate the duty cycle?
   A. 25% C. 22.5%
   B. 2.5% D. 0.25%

8. Which label indicates the position of pin 20 in the IC as shown below?



   A. i C. iii
   B. ii D. iv

9. A byte is also known as _____.
   A. 4 bit C. 32 bit
   B. word D. 2 nibble

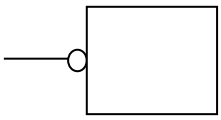
10. Which of the following number is an invalid BCD Code?
    A. 0111 C. 0101
    B. 1011 D. 1000

11. What is the basic logic function that is used to calculate addition of binary numbers? A. counting function C. comparison function
    B. encoding function D. arithmetic function

12. Error detection is done by _____.
    A. sign bit C. GRAY code
    B. BCD code D. parity code

13. Which of the following statement is **FALSE** about the digital advantages?
    A. Less affected by noise
    B. Compatibility with existing analog system
    C. Less maintain on accuracy and precision
    D. Consider only two voltage level

14. What is the meaning of the symbol?



A. on-state
B. active high
C. active low
D. pulse state

15. Calculate lower and upper bound for 2's complement for 14 bit.
A. Lower = -8191, Upper = 8191
B. Lower = -8192, Upper = 8191
C. Lower = -16384, Upper = 16383
D. Lower = -32768, Upper = 32,767

PART B: STRUCTURED QUESTIONS [Total mark 45 marks]
Answer all the questions in the answer booklet.

Question 1 [10 Marks]

a) Calculate the pulse width (t_w) of a system in second (s) with 25% duty cycle and frequency 40Hz. Draw the waveform for 3 cycles and clearly label it with pulse width, period and amplitude. Show all your workings. [7m]

b) Calculate the period (T) of the signal in nanosecond (ns) given the frequency as 150MHz. Show all your workings. [3m]

Question 2 [11 Marks]

a) Convert binary value 111001_2 to GRAY code. Show all your workings. [3m]

b) Complete Table 1 in answer booklet with the correct characters and values by referring to ASCII Table (Table 2) on page 6. [8m]

Table 1

Character	ASCII Hexa	Binary (7 bit)	ODD Parity (8 bit)	New ASCII Hexa
			0 101 1000	
				AB
	74			

Question 3 [9 Marks]

Convert the following numbers. Show all your workings.

a) 41.07_{10} to octal. Answer in 4 radix points. [3m]

b) 65.137_{16} to decimal. Answer in 4 radix points. [3m]

c) 11001.100101_2 to hexadecimal. [3m]

Question 4 [15 Marks]

a) Convert -39_{10} to the following representations using 7 bit. Show all your workings. [5m]
   i. Sign magnitude
   ii. 1's complement
   iii. 2's complement

b) Using 8 bit system, perform the arithmetic operation using 2's complement method. Show all your workings. [10m]
   i. 20 + 17
   ii. -4 - 23

Table 2: ASCII Table

Decimal	Hex	ASCII	Decimal	Hex	ASCII	Decimal	Hex	ASCII	Decimal	Hex	ASCII
0	00	NUL	32	20	(blank)	64	40	@	96	60	`
1	01	SOH	33	21	!	65	41	A	97	61	a
2	02	STX	34	22	"	66	42	B	98	62	b
3	03	ETX	35	23	#	67	43	C	99	63	c
4	04	EOT	36	24	$	68	44	D	100	64	d
5	05	ENQ	37	25	%	69	45	E	101	65	e
6	06	ACK	38	26	&	70	46	F	102	66	f
7	07	BEL	39	27	'	71	47	G	103	67	g
8	08	BS	40	28	(	72	48	H	104	68	h
9	09	HT	41	29	)	73	49	I	105	69	i
10	0A	LF	42	2A	*	74	4A	J	106	6A	j
11	0B	VT	43	2B	+	75	4B	K	107	6B	k
12	0C	FF	44	2C	,	76	4C	L	108	6C	l
13	0D	CR	45	2D	-	77	4D	M	109	6D	m
14	0E	SO	46	2E	.	78	4E	N	110	6E	n
15	0F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	|
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	^	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	(delete)

ANSWER SHEET

Name	
Metric No	
Lecturer (Circle)	**□ Rashidah bt Kadir** **□ Zuriahati bt Mohd Yunos** **□ Firoz bin Yusuf Patel Dawoodi**

PART A (OBJECTIVE)

Mark your answer clearly.

Example: =A= =●= =C= =D=

1. =A= =B= =C= =D=

2. =A= =B= =C= =D=

3. =A= =B= =C= =D=

4. =A= =B= =C= =D=

5. =A= =B= =C= =D=

6. =A= =B= =C= =D=

7. =A= =B= =C= =D=

8. =A= =B= =C= =D=

9. =A= =B= =C= =D=

10. =A= =B= =C= =D=

11. =A= =B= =C= =D=

12. =A= =B= =C= =D=

13. =A= =B= =C= =D=

14. =A= =B= =C= =D=

15. =A= =B= =C= =D=