School of Computing

UNIVERSITI TEKNOLOGI MALAYSIA

RESEARCH UNIVERSITY

TEST 1 SEMESTER I 2018/2019

SUBJECT CODE	:	**SCSR1013**
SUBJECT TITLE	:	**DIGITAL LOGIC**
COURSE	:	**SCSR/SCSJ/SCSB/SCSV/SCSP**
TOTAL TIME	:	**1 HOUR 15 MINUTES**
DATE	:	**12 / 10 / 2018**
VENUE	:	**L50 AND N24**

(GENERAL INSTRUCTION):

Answer all questions from Part A and B.

1. Write ALL your answers in the answer booklet.

2. Show all your works.

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 / 10**
Lecturer (Circle)	**Mr Firoz / Ms Marina / Dr Mazura / Dr Mohd Foad Mr Muhalim / Dr Raja Zahilah / Mrs Rashidah**

This question booklet consists of 8 pages including the front page.

PART A: OBJECTIVE QUESTIONS [Total mark 15 marks]

Answer all the questions in the answer booklet. Read each statement carefully.

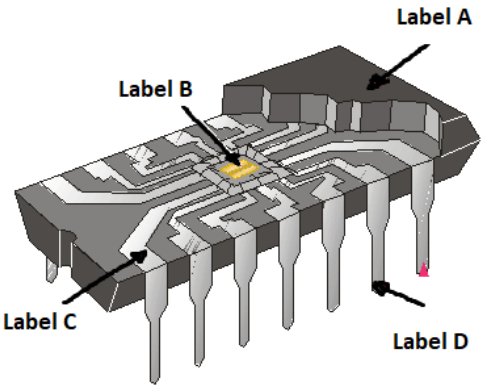
1. The basic logic gate whose output is the complement of the input is the:
   A. OR gate
   B. AND gate
   C. NOT gate
   D. comparator gate

2. How many inputs of an AND gate must be HIGH in order for the output of the logic gate to go HIGH?
   A. Any one of the inputs
   B. Only one of the inputs
   C. Any three of the inputs
   D. All of the inputs

3. Which logic function performs subtraction operations?
   A. Comparator
   B. Decoder
   C. Adder
   D. DeMUX

4. Which logic function that select only one digital input of several digital inputs and forward the selected input to a single line at one time?
   A. MUX function
   B. DeMUX function
   C. Encoding function
   D. Counting function

5. The figure below shows DIP IC. Which label indicates position of the chip?



   A. Label A
   B. Label B
   C. Label C
   D. Label D

6. Arrange the complexity classifications for fixed-function ICs from smallest to largest.
   A. ULSI, VLSI, LSI, MSI, SSI
   B. SSI, MSI, LSI, VLSI, ULSI
   C. SSI, LSI, MSI, VLSI, ULSI
   D. VLSI, LSI, MSI, SSI, ULSI

7. The following are integrated circuit technologies **except**:
   A. TTL
   B. ECL
   C. CMOS
   D. XNOR

8. Which statement is **not** the advantage of Programmable Logic Device (PLD)?
   A. More logic circuit can be stuffed into much smaller area.
   B. Certain PLD design can be changed without rewiring or replacing components.
   C. Can be implemented faster once the required programming language is mastered.
   D. A specific logic function is hardwired in the IC.

9. Which of the following statement is **false** for Field Programmable Gate Arrays (FPGA)?
   A. FPGA cannot be programmed using source code in a hardware description language (HDL).
   B. FPGA has different internal organization than SPLD and CPLD.
   C. FPGA has fine grain class (smaller logic block).
   D. FPGA has coarse grain class (large logic block).

10. Which statement is **false**?
    A. There are three major types for PLD such as SPLD, CPLD and FPGA.
    B. PLA and PROM are categorized as SPLD.
    C. PAL and GAL are categorized as FPGA.
    D. Text based PLD programming uses Hardware Description Language (HDL) such as ABEL, CUPL and WinCUPL.

11. Which statement is **false** about this number 1234_8?
    A. This number is valid.
    B. This number use octal system.
    C. Digit 2 has its value of $2x8^3$.
    D. Digit 4 has its value of 4.

12. Which of the following is **false** about hex numbering system?
    A. It has base 16.
    B. Digit A, B, C, D, E, F, G are valid.
    C. We can convert hex number to octal number.
    D. Conversion number from binary to hex is possible.

13. Code is generated with certain rules that abide to the followings **except**:
    A. Code must be unique.
    B. Code can simplify the process of information in digital system.
    C. Code cannot be converted into another form.
    D. Morse code is one of examples of communication code.

14. Which of the following number is an invalid BCD Code?
    A. 0111
    B. 1000
    C. 1001
    D. 1010

15. Which of the following statement is **false** about parity code?
    A. Parity bit is used to detect error.
    B. The bit for ODD parity must always be 1.
    C. Parity bit is appended at MSB binary value.
    D. EVEN parity is a valid parity code.

PART B: SUBJECTIVE QUESTIONS [Total mark 60 marks]
Answer all the questions in the answer booklet. Show all your works.

Question 1 [5 Marks]

a) What are three processes that can be implemented on data in a digital system? [1.5 marks]

b) Given a typical hybrid system for an audio system as illustrates in Figure 1. What is the data type, X and the converter component, *Y*. [1 mark]

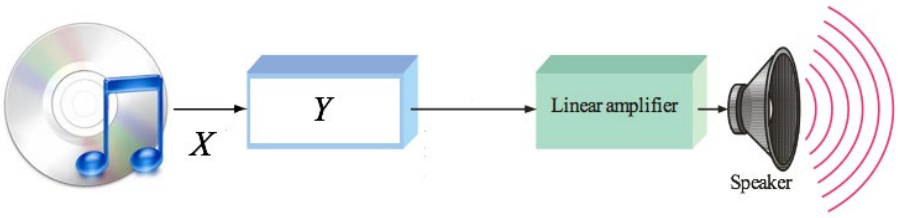


Figure 1

c) State three disadvantages of digital systems. [2.5 marks]

Question 2 [15 Marks]

a) Given a periodic signal in Figure 2. Calculate the frequency of signal *f*, in *mHz*. [3 marks]

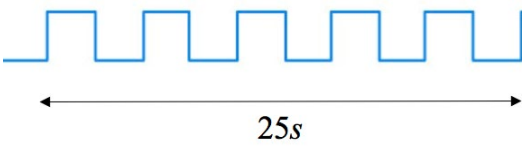


Figure 2

b) Calculate the time period of the signal in *pico second* (*ps*) given the frequency as 100 *THz*. Show all your works. [3 marks]

c) Given the duty cycle of a system is 40% for a duration of 500 *ms*. Calculate the off state period. Show all your works. [4 marks]

d) Construct a complete the timing diagram with the clock and all digital waveforms based on Table 1. [5 marks]

Table 1

Clock (↑)	Inputs		Output
	A	**B**	**C**
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1

Question 3 [11 Marks]

a) Convert $1C4_{16}$ to decimal value. [4 marks]

b) Convert 13.34_{10} to binary value (5 fractional point). [4 marks]

c) Convert 101010011.11010_2 to octal value. [3 marks]

Question 4 [15 Marks]

a) For following conversion code, show all the workings. [5 marks]

i) Convert binary value 101101_2 to GRAY code.

ii) Convert GRAY code 111101_{gray} to binary value.

b) Given the 7 bit ASCII code in the table below, convert the password code Ma28& to its hex value using ODD parity coding. Show all your workings. [10 marks]

Dec	Hex	Oct	Char
77	4D	115	M
97	61	141	a
50	32	062	2
56	38	070	8
38	26	046	&

Question 5 [14 Marks]

a) Calculate lower bound, upper bound and range for 11 bit unsigned integer data. Show all your workings. [2 marks]

b) Using 8 bit binary system, convert -75_{10} to the following representations.

i) sign magnitude

ii) 1's complement

iii) 2's complement

Show all your workings. [5 marks]

c) Using 8-bit binary system,

i) perform the arithmetic operation of the decimal numbers, 10 – 17 using 2's complement method.

ii) convert your answer in c (i) back to its decimal value.

Show all your workings. [7 marks]

ANSWER SHEET

Name	
Metric No	
Lecturer (Circle)	**Mr Firoz / Ms Marina / Dr Mazura / Dr Mohd Foad** **Mr Muhalim / Dr Raja Zahilah / Mrs Rashidah**

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=