UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME	:	FUNDAMENTALS OF COMPUTER ARCHITECTURE
COURSE CODE	:	DAT 10403
PROGRAMME	:	1 DAT
EXAMINATION DATE	:	JUNE 2016 / JULY 2016
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER:

(A) **ALL FOUR (4)** QUESTIONS IN **SECTION A**, AND

(B) **ONE (1)** QUESTION **ONLY** IN **SECTION B**

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

SECTION A: ANSWER **ALL FOUR (4)** QUESTIONS

Q1 (a) Choose the correct word/words based on the following lists to fill in the blanks.

Central processing unit	polling	Instruction set	Vacuum tubes
Number system	Computer Architecture	Cache memory	Interconnection structures
capacity	Sequential access	array	transistors

(i) The _____ for internal memory is typically expressed in terms of bytes or words.

(ii) Memory _____ is made in a specific linear sequence.

(iii) _____ is a very high speed semiconductor memory which can speed up CPU.

(iv) A computer keyboard is an _____ of switches, each of which sends the PC a unique signal when pressed.

(v) _____ refers to those attributes of a system visible to a programmer, or put in another way, those attributes that have a direct impact on a logical execution of a program.

(vi) _____ controls the operation of the computer and performs its data processing function; often referred to as processor.

(vii) First generation electronic computers used the _____ technology.

(viii) A collection of different instructions that the processor can execute is referred to as the processor's _____.

(ix) Collection of paths connecting various modules is called the _____.

(x) A _____ defines how a number can be represented using distinct symbols and can be represented differently in different systems.

(10 marks)

(b) Define the following terms.

(i) Moore's Law.
(ii) Digital circuits.
(iii) Machine language.
(iv) Assembly language

(8 marks)

(c) Justify whether Moore's Law describes the increasing IT costs due to new technology.

(2 marks)

Q2 (a) Explain the **FOUR (4)** major structural components of a CPU.

(4 marks)

(b) Illustrate the logic gates diagram based on the following truth table.

(i)

A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

(ii)

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

(iii)

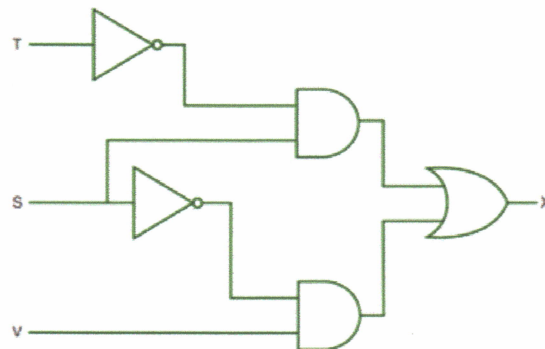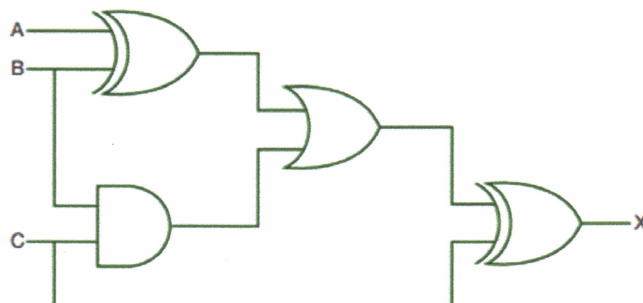| A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

(6 marks)

(c) Produce a truth table based on the following logic gates diagram.

(i)

(5 marks)

(ii)

(5 marks)

Q3 (a) Determine the sign-magnitude representation for the following numbers based on 8 bit binary sequence. Show all your workings.

   (i)   +2
   (ii)   -2

(2 marks)

(b) Determine the twos complement representation for the following numbers based on 8-bit binary sequence. Show all your workings.

   (i)   -19
   (ii)   -12
   (iii) -3
   (iv)   -4

(8 marks)

(c) Convert the decimal number 14 into the following numbering system. Show all your workings.

   (i)   Binary number (base 2).
   (ii)   Hexadecimal number (base 16).
   (iii) Octal number (base 8).
   (iv)   Base 4
   (v)   Base 5

(10 marks)

Q4 (a) State the meaning for the following instruction set statements.

   (i)   MOV R1, #2FH
   (ii)   ADD A, R2
   (iii) RL A
   (iv)   SUB A1, B

(8 marks)

(b) Convert the decimal fraction number 0.81 in base-10 to binary fraction number base-2 to 6 points. Show all your workings.

(10 marks)

(c) Determine the content of Accumulator (A) after the following instruction is executed.

1	0	1	0	0	0	1	1

   (i)   RL A
   (ii)   RR A

(2 marks)

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SECTION B: ANSWER **ONE (1)** QUESTION ONLY.

Q5   (a)   Define the following:

(i)   Arithmetic Logic Unit (ALU).
(ii)   CPU Interconnections.

(4 marks)

(b)   Convert the following binary number into the base 10 numbering system. Show all your workings.

(i)   00001111.
(ii)   00001010.
(iii)   00001101.
(iii)   00011000
(iv)   00001110

(10 marks)

(c)   Define the following system bus design.

(i)   Data bus.
(ii)   Address bus.
(iii)   Control bus.

(6 marks)

Q6   (a)   State the **FOUR (4)** common numbering systems.

(4 marks)

(b)   Write an assembly code that will perform the following instructions.

(i)   Data in 01H is moved to the address 20H.
(ii)   Content in A is copied to Port 1.
(iii)   Rotate Left A.
(iv)   Rotate Right B.
(v)   Subtract content of B from A1.

(10 marks)

(c)   State **TWO (2)** advantages for each of the following computer languages categories.

(i)   High Level Language.
(ii)   Assembly Language.
(iii)   Machine Language.

(6 marks)

- END OF QUESTIONS -