CMR
INSTITUTE OF
TECHNOLOGY

USN

Internal Assesment Test - I

Sub:	COMPUTER ORGANIZATION							Code:	16MCA14
Date:	03/11/2016	Duration:	90 mins	Max Marks:	50	Sem:	I	Branch:	MCA
Answer Any FIVE FULL Questions									

		Marks	OBE CO	OBE RBT
1	Perform the following conversions:	[10]	CO1, CO3	L3

$ABC_{16} = (?)_{10}$

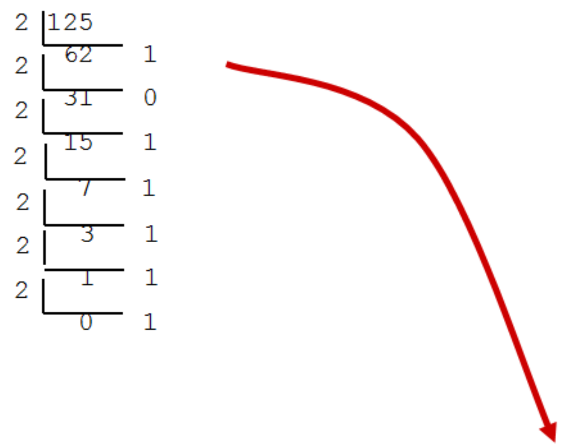
ABC_{16} =>

$C \times 16^0 = 12 \times 1 = 12$
$B \times 16^1 = 11 \times 16 = 176$
$A \times 16^2 = 10 \times 256 = 2560$

2748_{10}

$125_{10} = (?)_2$

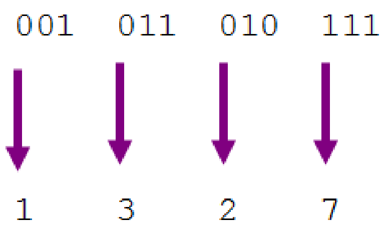
$125_{10} = ?_2$



$125_{10} = 1111101_2$

$1011010111_2 = (?)_8$

$1011010111_2 = ?_8$



$1011010111_2 = 1327_8$

$1F0C_{16} = (?)_8$

$1F0C_{16} = ?_8$

1 F 0 C

0001 1111 0000 1100

1 7 4 1 4

$1F0C_{16} = 17414_8$

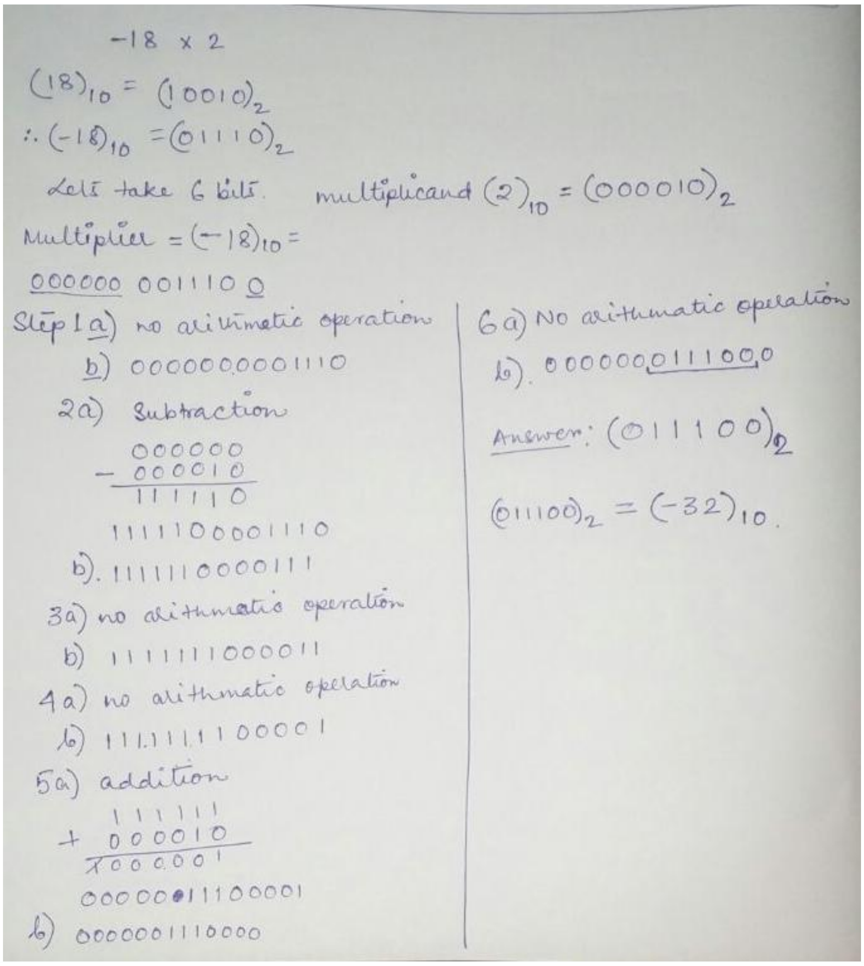
$1234_{10} = (?)_{16}$

$1234_{10} = ?_{16}$

16	1234	
16	77	2
16	4	13 = D
	0	4

$1234_{10} = 4D2_{16}$

2 Apply Booth's algorithm and multiply -18 x 2 [10] CO3 L3


-18 x 2

$(18)_{10} = (10010)_2$

$\therefore (-18)_{10} = (01110)_2$

Let's take 6 bits. multiplicand $(2)_{10} = (000010)_2$

Multiplier $= (-18)_{10} =$

000000 001110 0

Step 1 a) no arithmetic operation

b) 000000000111 0

2 a) Subtraction

000000
− 000010
111110

111110000111 0

b). 111111000011 1

3 a) no arithmetic operation

b) 111111100001 1

4 a) no arithmetic operation

b) 111111110000 1

5 a) addition

111111
+ 000010
X000001

000001111000 01

b) 000000111100 00

6 a) No arithmetic operation

b). 000000011110 0,0

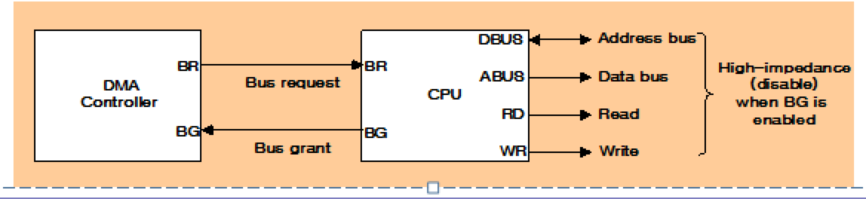
Answer: $(011100)_2$

$(011100)_2 = (-32)_{10}$.

3	Discuss the role of DMA. Draw the block diagram and explain how DMA controller works	[10]	CO2, CO4	L2

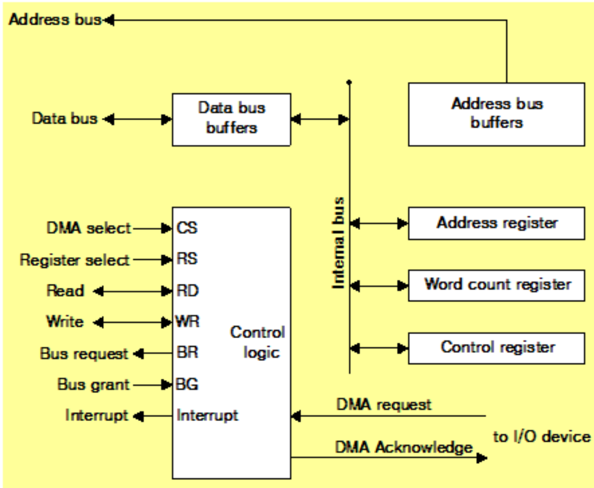
DMA

- DMA controller takes over the buses to manage the transfer directly between the **I/O device** and **memory** *(**Bus Request/Grant** 신호이용)*

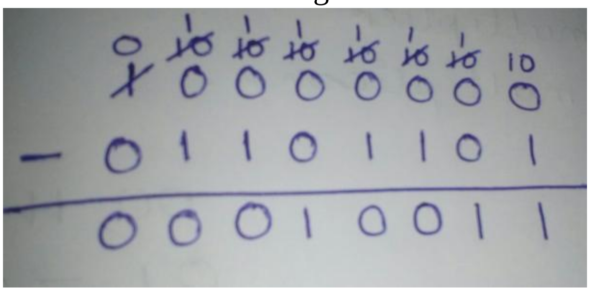


DMA Controller (Intel 8237 DMAC) : *Fig. 11-17*

- DMA Initialization Process
  - » 1) Set Address register :
    - memory address for read/write
  - » 2) Set Word count register :
    - the number of words to transfer
  - » 3) Set transfer mode :
    - read/write,
    - burst/cycle stealing,
    - I/O to I/O,
    - I/O to Memory,
    - Memory to Memory
    - Memory search
    - I/O search
  - » 4) DMA transfer start : *next section*
  - » 5) EOT (End of Transfer) :
    - Interrupt



4	Perform the subtraction 10000000-01101101. Draw and explain the circuit of a full subtractor combining two half subtractors	[10]	CO3	L3



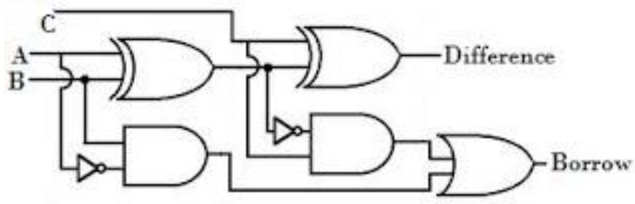
Full Subtractor : A logic Circuit Which is used for Subtracting Three Single bit Binary digit is known as Full Subtractor.The Truth Table of Full Subtractor is Shown Below.

Full Subtractor-Truth Table				
Input			Output	
A	B	C	Difference	Borrow
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1
www.flintgroups.com				

From the Truth Table The Difference and Borrow will written as

Difference=A'B'C+A'BB'+AB'C'+ABC
Reduce it like adder
Then We got
Difference=$A\oplus B\oplus C$
Borrow=A'B'C+A'BC'+A'BC+ABC
=A'B'C+A'BC'+A'BC+A'BC+A'BC+ABC ----------
> A'BC=A'BC+A'BC+A'BC
=A'C(B'+B)+A'B(C'+C)+BC(A'+A)
Borrow=A'C+A'B+BC

The logic diagram of Full Subtractor is Shown below



Full Subtractor-Logic Diagram
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5 What is DeMorgan's theorem? Find the complement of the following functions applying DeMorgan's theorem: [10] CO1 L1
a) F(x,y,z) = x'yz'+x'y'z b)F(x,y,z)=x(y'z+yz)

De Morgan has suggested two theorems which are extremely useful in Boolean Algebra. The two theorems are discussed below.

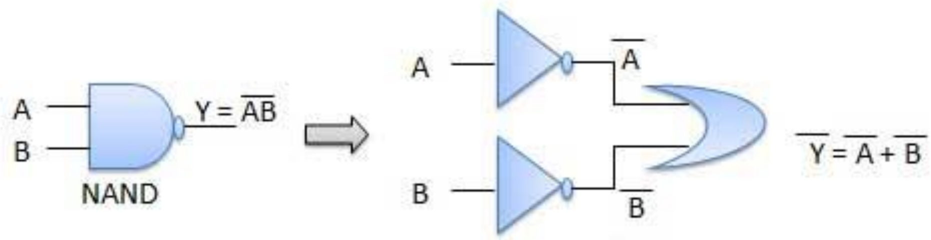
Theorem 1

$\overline{A.B} = \overline{A} + \overline{B}$

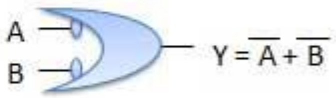
NAND = Bubbled OR

- The left hand side (LHS) of this theorem represents a NAND gate with inputs A and B, whereas the right hand side (RHS) of the theorem

represents an OR gate with inverted inputs.
- This OR gate is called as **Bubbled OR**.



NAND $\equiv$ Bubbled OR



Bubbled OR

Table showing verification of the De Morgan's first theorem −

A	B	$\overline{AB}$	$\overline{A}$	$\overline{B}$	$\overline{A} + \overline{B}$
0	0	1	1	1	1
0	1	1	1	0	1
1	0	1	0	1	1
1	1	0	0	0	0

Theorem 2

$$\overline{A + B} = \overline{A} . \overline{B}$$

NOR = Bubbled AND

- The LHS of this theorem represents a NOR gate with inputs A and B, whereas the RHS represents an AND gate with inverted inputs.
- This AND gate is called as **Bubbled AND**.

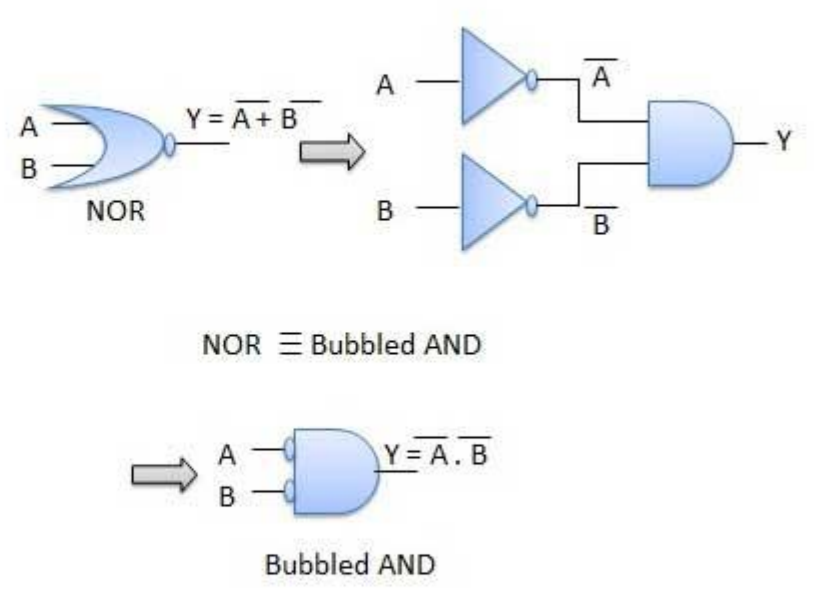


Table showing verification of the De Morgan's second theorem −

A	B	$\overline{A+B}$	$\overline{A}$	$\overline{B}$	$\overline{A}.\overline{B}$
0	0	1	1	1	1
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	0

(a) $F(x,y,z) = x'yz' + x'y'z$ **(b) $F(x,y,z) = x(y'z + yz)$**

(a) $x'yz' + x'y'z$

$= (x'yz' + x'y'z)'$

$= (x'yz')'(x'y'z)'$

$= (x'' + y' + z'')(x'' + y'' + z')$

$= (x + y' + z)(x + y + z')$

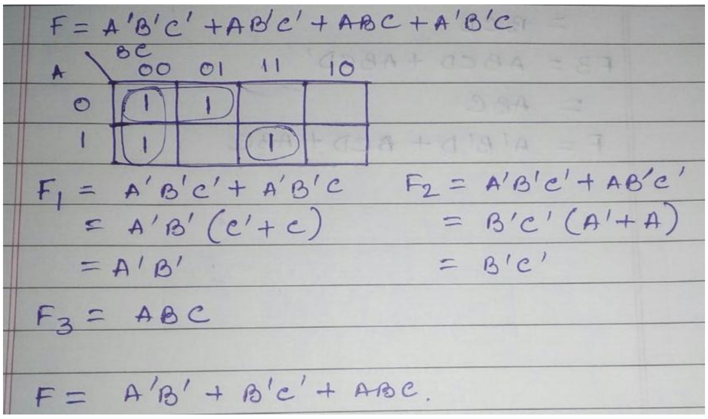
(b) $x(y'z + yz)$

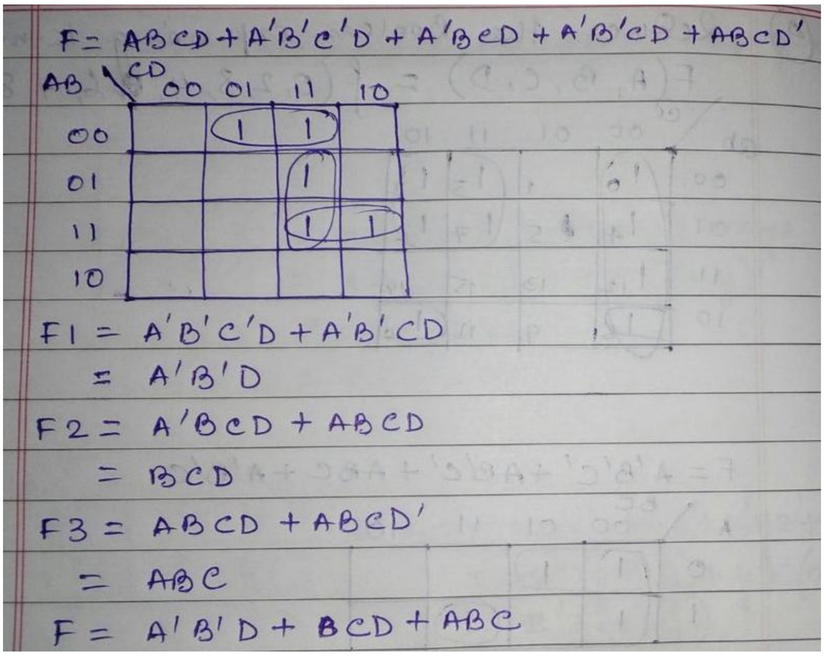
$= x' + (y'z + yz)'$

$= x' + (y'' + z')(y' + z')$

$= x' + (y + z')(y' + z')$

6	Simplify the following Boolean expression using K-map: i) A'B'C'+AB'C'+ABC+A'B'C ii) ABCD+A'B'C'D+A'BCD+A'B'CD+ABCD'	[10]	CO1	L3





7	Explain with a flowchart the different instruction types of a computer system.	CO2	L5

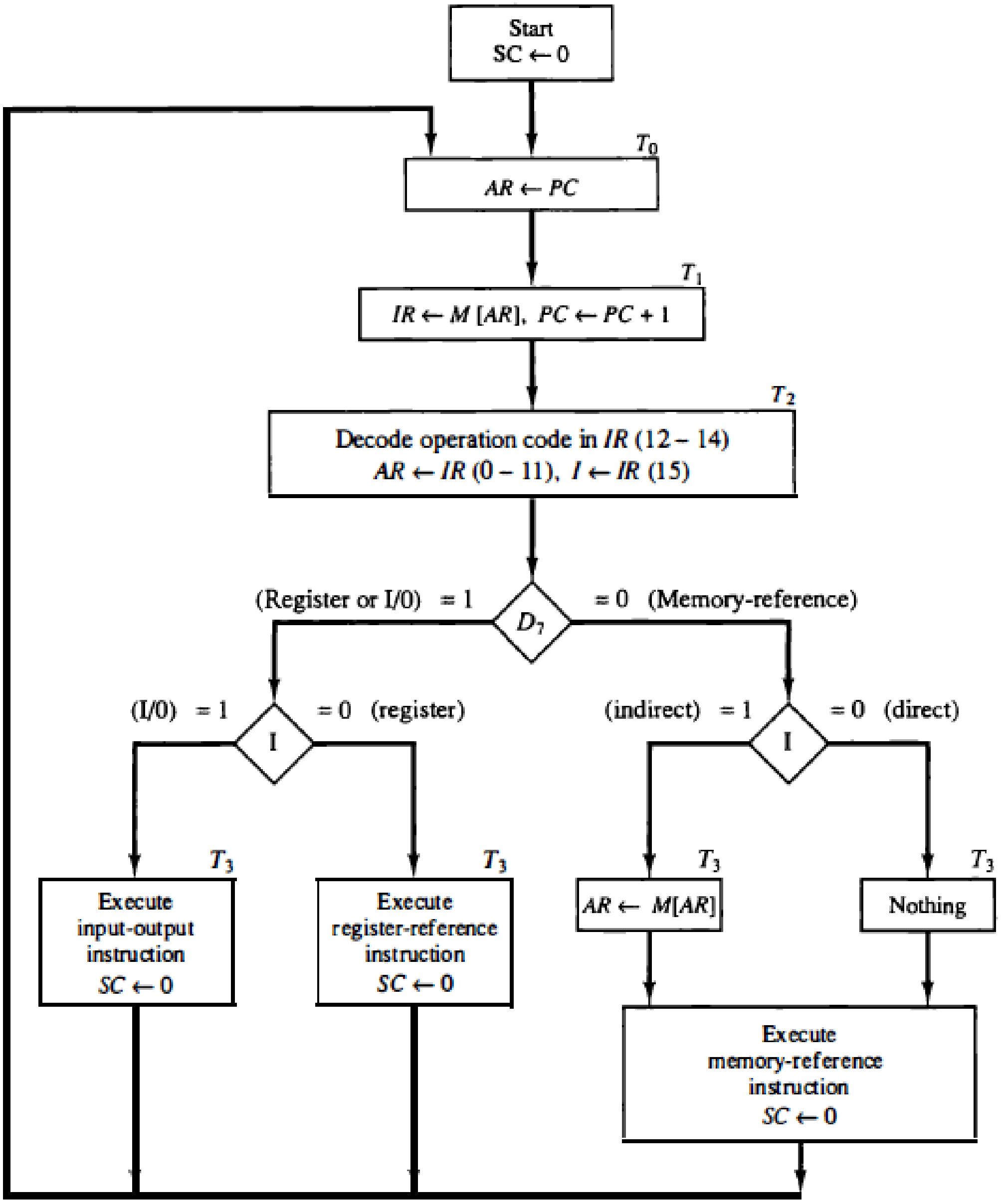


Figure 5-9 Flowchart for instruction cycle (initial configuration).

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1:	Understand the Basics of Digital System	1	1	-	-	-	-	-	3
CO2:	Understand the Basics of Computer System Organization	1	1	-	-	-	-	-	3
CO3:	Apply the concepts of the number system in Designing Digital System.	3	2	-	-	-	-	-	-
CO4:	Analyse the need of Logic circuits in digital system	2	3	1	-	-	-	-	-
CO5:	Create logic circuits for real time requirement	1	1	3	-	-	-	-	-

Cognitive level	KEYWORDS
L1	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
L2	summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
L3	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover.
L4	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer.
L5	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize.

PO1 – Apply *knowledge*; PO2 - *Problem analysis*; PO3 - *Design/development of solutions*; PO4 – team work ; PO5 – *Ethics* ; PO6 -Communication; PO7- *Business Solution*; PO8 – Life-long learning