9/7/21

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CO (2CSE205)

(1) ~~Init~~ Initial value of R = 75, in binary it is R = 01110101

(a) Add immediate operand C7 to R

	1 0 1 1 1
75	0111 0101
C7	1100 0111
13C	10011 1100

C = 1 S = 1 Z = 0 V = 1

(b) Add immediate operand 2E to R

	1 1 1 1 1	
75	0111 0101	C = 1
2E	0010 1110	S = 1
A3	1010 0011	Z = 0
		V = 0

(c) Subtract the immediate operand from 8A to R

8A	10001010	2's complement
	01110110	
75	01110101	
EB	11101011	

C = 1 S = 1 Z = 0 V = 0

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(d) AND immediate operand 8D to R

75	0111 0101
8D	1000 1101
05	0000 0101

C=0 S=0 Z=0 V=0

(e) Exclusive-OR R with R

75	0111 0101
75	0111 0101
00	0000 0000

C=0 S=0 Z=1 V=0

Ans 2 (a) Given, 2048 words of RAM,
$4 \times 2^{10} = 4 \times 1024 = 4096$ words of ROM.

$\frac{2048}{256} = \frac{2 \times 2^{10}}{2^8} = \frac{2^{11}}{2^8} =$ 8 chips of RAM

and $\frac{4096}{1024} =$ 4 chips of ROM

$\Rightarrow$ We need 4 chips of ROM and 8 chips of RAM

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(b) Address Ranges :-

RAM - 0000 - 07FF
ROM - 4000 - 4FFF
Interface - 8000 - 800F

(c) Memory Address Map :-

Component	Address (HEX)	ADDRESS BUS 16 15 14 13 12 .... 8765 ... 4321
RAM	0000-07FF	0 0 0 0 0 $\xleftrightarrow{3\times8}$ Decoder XXXX XXXX
ROM	4000-4FFF	0 1 0 0 $\xleftrightarrow{2\times4}$ Decoder XXXX XXXX
Interface	8000-800F	1 0 0 0 0000 0000 XXXX

Ans 3 (a) $t_p = 60 + 7 = 67$ ns

(b) $t_n = 50 + 60 + 20 = 130$ ns

⇒ It will take 130 ns for non-pipeline system.

(c) $S = \frac{n t_n}{(k+n-1)t_p} = \frac{20 \times 130}{(3+19)67} = \underline{1.763}$

~~Gotta~~ now for $n = 150$,

$S = \frac{n t_n}{(k+n-1)t_p} = \frac{150 \times 130}{(3+149)67} = \underline{1.914}$

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∴ The speedup of pipline for 20 task is 1.763 and for 150 task is 1.914.

(d) $S_{max} = \frac{t_n}{t_p} = \frac{130}{67} = 1.9403$

∴ The maximum speedup that can be achieved is 1.9403

X X X