



# 2022 학년도 제 1 학기 (중간/기말) 시험답안지

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## 한양대학교 시험부경행위 방지 '학생 윤리강령'

본인은 한양대학교 학생으로서 시험부경행위 방지를 위해 학업수행 과정에서 일체의 부정행위 방법을 사용하지 않으며, 양심과 도덕성을 행동의 기준으로 삼을 것을 서약합니다.

과목명	학과	학년	학번	성명
컴퓨터 구조	ICT융합학부	3	201904064	정지은

1. there are 3 types of pipeline hazards.

① Resource hazard - hardware structure problem.

② Data hazard - data dependency

③ Control hazard - conditional branch

2. CISC (Complex Instruction Set Computer), RISC (Reduced Instruction Set Computer)

① CISC has more instructions rather than RISC. (CISC가 RISC보다 명령어 개수가 많다) (32비트)

② CISC has different length instruction, but RISC has same length instruction. (CISC의 명령어 길이는 다르지만, RISC 명령어 길이는 같다)

③ RISC has more registers rather than CISC. (RISC가 CISC보다 register 개수가 더 많다)

④ example of CISC = x86 example of RISC = ARM

⑤ 전자적인 성능은 RISC가 더 좋다

3. DRAM is smaller, simpler, less expensive rather than SRAM.

SRAM is faster rather than DRAM

① DRAM is used for Main Memory, SRAM is used for cache.

4. ①  $n=4$   $2^{k-1} \geq n+k \Rightarrow 2^{k-1} \geq k+4 \Rightarrow 2^k \geq k+5$   $k=3$

7	6	5	4	3	2	1
0111	0110	0101	0100	0011	0010	0001
(D4)	(D3)	(D2)	C4	(D1)	C2	C1
1	1	0		0		

$$\Rightarrow C1 = D1 + D2 + D4 = 0 + 0 + 1 = 1$$

$$C2 = D1 + D3 + D4 = 0 + 1 + 1 = 0$$

$$C4 = D2 + D3 + D4 = 0 + 1 + 1 = 0$$

$\Rightarrow$  check bit = 001

② for SECDED, 4 check bits (3+1) are needed. Because of parity-even.

5. 5시간 200

① 5번 스캔/sec 5 hours =  $5 \times 60 \times 60 \times 5 = 90000$

②  $200 / 90000 = 0.00222... \approx 0.002$

(앞면에 계속)

6. ①  $6-15 = 6+(-15) = -9$

$15 = 00001111$

$one's = 11110000$

$two's = 11110001$

$6 = 00000110$

$\downarrow$   
 $11110111$

공유하는 한비자 2차 부강원(한비자)

$one's = 00001000$

$two's = 00001001 = 9$  (정답)

- Sign = 1
- Carry = 0
- half-carry = 0
- overflow = 0
- parity-even = 0

②  $-8+40 = 32$

$8 = 00001000$

$one's = 11110111$

$two's = 11110110$

$40 = 00101000$

$\downarrow$   
 $(1)00101000$

Sign bit

- Sign = 0
- Carry = 1 (지리블의 개성)
- half carry = 1
- overflow = 0
- parity-even = 0 (비트단위)

7. 

VPN	PFN
0	4
1	7
2	-
3	2
4	-
5	0

  
 a)  $1023 = 0 \times 1024 + 1023$  (VPN=0, offset=1023, PFN=4)  
 $\Rightarrow 1024 \times 4 + 1023 = 5119$   
 b)  $6120 = 5 \times 1024 + 1000$  (VPN=5, offset=1000, PFN=0)  
 $\Rightarrow 1024 \times 0 + 1000 = 1000$

③ page 2, 4

8. A B D C E C A C B D A B E B A C

① LRU:  $0000 \xrightarrow{A} A B D C \xrightarrow{B} B D C E \xrightarrow{D} B D E C \xrightarrow{E} D E C A \xrightarrow{C} D E A C \xrightarrow{B} E A C B$   
 $\xrightarrow{A} A C B D \xrightarrow{C} C B D A \xrightarrow{D} C D A B \xrightarrow{E} D A B E \xrightarrow{B} D A E B \xrightarrow{A} D E B A \xrightarrow{C} E B A C$   
 $\Rightarrow 4+1+1+1+1+1+1 = 10$  page transfer

③ FIFO:  $0000 \xrightarrow{A} A B D C \xrightarrow{B} B D C E \xrightarrow{D} D C E A \xrightarrow{C} C E A B \xrightarrow{B} E A B D \xrightarrow{A} A B D C$   
 $\Rightarrow 4+1+1+1+1+1 = 9$  page transfer

9. 

base	register
20	50
30	60
50	70
60	20
70	30

  
 $\Rightarrow$  ① 30 ② 30 ③ 60 ④ 70 ⑤ 60

11.  $n=4000$  four stage  $\Rightarrow k=4$

① Cycles =  $4000 + 4 - 1 = 4003$

③ pipelined  $\Rightarrow$  cycles =  $(1-pq)[k+n-1]$   $p=0.2, q=0.4, k=4, n=4000$   
 $= 0.92 \times 4003 = 3682.76 \rightarrow 3683$  cycles are needed

12. nonpipelined  $\Rightarrow T = \frac{1}{f} = \frac{1}{10 \times 10^6} = 0.1 \text{ ns}$  / pipeline  $\Rightarrow T = \frac{1}{f} = \frac{1}{8 \times 10^6} = 0.125 \text{ ns}$

① Speed up ratio =  $\frac{(n+1)T}{(n+2) \times 0.125} = \frac{(5n) \times 0.1}{(n+2) \times 0.125} = \frac{0.5n}{0.125(n+2)} = \frac{0.5}{0.125} = 4$

② MIPS =  $\frac{f}{cycles}$

So, nonpipelined =  $\frac{10 \times 10^6}{5 \times 10^6} = 2 \times 10^3 = 2000 \text{ MIPS}$

pipeline =  $\frac{8 \times 10^6}{16} = 8 \times 10^3 = 8000 \text{ MIPS}$

$\Rightarrow$  pipelined processor's MIPS 는 nonpipelined processor's MIPS 의 4배다.

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