COMPUTER ORGANIZATIONS

(Instruction Pipelining, Cache & Main Memory, Secondary Storage)

SOLUTIONS

1. A pipelined CPU has a speed up of 4.5 over non-pipelined CPU and has an efficiency of 90%. How many stages are there?

(a) 5
(b) 4
(c) 6
(d) 3

Solution: Option (a)

Explanation:

$\frac{90}{100}[x] = 4.4 \Rightarrow x = \frac{45}{9} = 5$

2. A 2 way set associative cache is 256 Kbytes in size. What is the number of sets if block size is 16 Bytes?

(a) 4096
(b) 8192
(c) 1024
(d) 16,384

Solution: Option (b)

Explanation:

$\text{Number of Blocks} = \frac{256K}{16} = \frac{2^{18}}{2^4} = 2^{14};\ \text{Number of sets} = \frac{2^{14}}{2} = 2^{13} = 8192$

3. The decimal integer value of 1101 1001 (in 2's complement form) is

(a) – 39
(b) – 24
(c) – 57
(d) – 88

Solution: Option (a)

4. Which of the following keeps track of instruction execution sequence?

(a) Accumulator
(b) Program Counter
(c) Stack Pointer
(d) Instruction Register

Solution: Option (b)

Explanation:

PC stores the Address the Address of the next instruction.

5. Cache has the following specifications:

Number of sets = 128
2 way set Associative
Cache size = 4Kbytes
Main memory has 21 bit address

What are the sizes of the cache blocks and number of cache blocks respectively?

(a) 16 Bytes, 256
(b) 32 Bytes, 128
(c) 8 Bytes, 64
(d) 16 Bytes, 64

Solution: Option (a)

Explanation:

$128 \times 2 \times x = 4k$; (Block size)x = 16 Bytes

$$\text{Number of blocks} = \frac{4k}{16} = \frac{2^{12}}{2^4} = 2^8 = 256 \text{ Blocks}$$

6. A cache is having 60% hit ratio for read operation. Cache access time is 30 ns and main memory access time is 100 ns, 50% operations are read operation.

What will be the average access time for read operation?

(a) 50 ns
(b) 58 ns
(c) 100 ns
(d) 70 ns

Solution: Option (d)

Explanation:

$0.60 \times 30 + 0.40 \times 130 = 70ns$

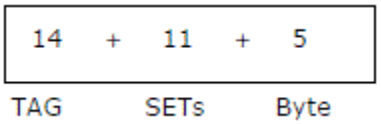
7. A CPU has 30 bit memory address and 512Kbyte cache organized into 8-way set associative cache and block size is 32 Bytes.

What is the number of bits required in TAG for comparator matching?

(a) 16 (b) 11
(c) 17 (d) 14

Solution: Option (d)

Explanation:



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