

1. For a system, assume, RAM= 64KB, block size = 4 bytes, cache size = 64 bytes, 2-way set associative mapping. Given the state of the cache shown below, find hit/miss for the following addresses generated by CPU. In case of cache hit, show the contents of memory read by the processor. You MUST show the detailed procedure for at the first address.

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CACHE MEMORY

SET	TAG OF LINE	CONTENTS
0	9B1H	1CH
		2DH
		30H
		4FH
	2BAH	EDH
		BDH
		ACH
		CAH
1	7A1H	A0H
		A2H
		A0H
		A0H
	468H	4BH
		3BH
		2BH
		1BH
2	90CH	30H
		20H
		60H
		40H
	2F7H	49H
		39H
		29H
		69H
3	736H	14H
		C4H
		34H
		4CH
	763H	49H
		33H
		24H
		10H

CACHE MEMORY

SET	TAG OF LINE	CONTENTS
4	6ECH	10H
		20H
		30H
		40H
	73FH	FFH
		EEH
		DDH
		CCH
5	3BBH	10H
		20H
		30H
		40H
	F44H	41H
		33H
		20H
		1FH
6	CF7H	11H
		22H
		33H
		44H
	1DDH	25H
		35H
		45H
		55H
7	67BH	91H
		21H
		31H
		B1H
	09BH	D0H
		A0H
		20H
		1FH

Memory address	Hit/Miss	Content read from cache in case of Cache Hit
90C4H		
9B1AH		
41EAH		
3BB8H		
F445H		
6ECFH		
E7F1H		
5EEBH		
5743H		
CF7CH		

2. For a system, RAM = 64KB, Block size = 4 bytes, Cache size = 128 bytes, Direct mapped cache. Calculate the Hit ratio while CPU runs program “Test_Cache”. Also count how many blocks are replaced in cache memory assuming the cache is empty at the beginning.
For the same RAM, block size and Cache memory, what would be the Hit ration in case of 2-way Set Associative Mapping?

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Main Program—“Test_Cache”

Memory address (decimal)	
0003	Instruction-1
0004	Instruction-2
0005	Instruction-3 (Call Function NSU-1)
0006	Instruction-4
0007	Instruction-7 (Call Function NSU-2)
0008	Instruction-8
0009	Instruction-9 (End of program)

Function NSU-1

Memory address (decimal)	
0128	Instruction-1
0129	Instruction-2
0130	Instruction-3
0131	Instruction-4
0132	Instruction-5
0133	Instruction-6 (return to Instruction-4 of main program--- Test_Cache)

Function NSU-2

Memory address (decimal)	
0136	Instruction-1
0137	Instruction-2
0138	Instruction-3
0139	Instruction-4 (return to Instruction-8 of main program --- Test_Cache)

3. A 12-bit Hamming code word containing 8 bits of data and 4 parity bits is read from memory. What was the original 8-bit data word that was written into memory if the 12-bit word read out is 110010111001
4. a) Convert 387.625 to IEEE 32-bit floating point format.
b) Convert the following IEEE 32 bit into decimal.

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Sign bit	exponent	significant
1	10001110	001100000000000000000000

QUIZ # 4/ Marks = 5

Design a memory module of 64M x 64 bits using ICs having capacity of 4M x 4 bits.