**Assignment 5**

**The final answers are provided showing the exact bits with no leading zeros and no spaces as required in question 1 & 2 and then followed by the detailed steps.**

2. 01
3. 001
4. 111000
5. yes
6. BC

The detailed steps:

0x705 = 0111 0000 0101

1. Block Size = 4 byte

Offset Length = log2(4) = 2 bits

Offset = 01

1. Number of Blocks = 16 Blocks

Number of Sets = Number of Blocks / 2 = 16/2 = 8 Sets

Set Index Length = log2(8) = 3 bits

Set Index = 001

1. Address Length = 12 bits

Offset Length = 2 bits

Set Index Length = 3 bits

Tag Length = 12 - 2 - 3 = 7 bits

Tag = 0111000 = 111000

1. yes

Set Index= 001 = 1

Tag = 111000 = 0x38

Offset = 01 =1

Byte 1 = BC

1. BC
3. 110
4. 1010
5. 101101
6. yes
7. EC

The detailed steps:

0x16D6 = 0001 0110 1101 0110

1. Block Size = 8

Offset Length = log2(8) = 3 bits

Offset = 110

1. Number of Sets = Number of Blocks = 16 Sets

Set Index Length = log2(16) = 4 bits

Set Index = 1010

1. Address Length = 16 bits

Offset Length = 3 bits

Set Index Length = 4 bits

Tag Length = 16 - 3 - 4 = 9 bits

Tag = 000101101 = 101101

1. yes

Set Index = 1010 = 0xA

Tag = 101101 =0x2D

Offset = 110 = 0x6

Byte 6 = EC

1. EC
3. Logical Address Size = (2^20) \* (2^12) = 2^32 bits
4. Number of Frames = (2^16) / (2^12) = 2^4 Frames

Size of Frame = 4 bits

1. Number of Entries in Page Table = Number of Pages in Logical Address Space = 2^20 Entries

| 2 | 0 | 1 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 7 | 2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 2 |
|  |  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
|  |  |  |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 7 | 7 |

Number of Faults = 8 Faults

Miss Ratio = 8/13

| 2 | 0 | 1 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 7 | 2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 2 | 2 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |  | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
|  |  |  |  | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

Number of Faults = 7 Faults

Miss Ratio = 7/13

| 1 | 2 | 0 | 1 | 7 | 0 | 1 | 2 | 0 | 1 | 0 | 3 | 0 | 4 | 2 | 3 | 0 | 3 | 7 | 2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 2 | 2 | 2 | 2 | 2 | 2 |
|  | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
|  |  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |  |  |  | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

Number of Faults = 7 Faults

Miss Ratio = 7/20