PALAYIL

ALAN

7935

1) ✓

2) ✓

3) ✓

4) ✓

5) ✓

6) ✓

7) ✓

Q1: 12/15

Q2: 16/20

Q3: 10/10

Q4: 15/20

53/65

Problem 1)

a)

$9 = (1001)_2$

$6 = (0110)_2$

$2 = (0010)_2$

$F = (1111)_2$

$0 = (0000)_2$

$0 = (0000)_2$

$0 = (0000)_2$

$0 = (0000)_2$

$S = 0$; $(-1)^S \times (1 + \text{Fraction}) \times 2^E$

$= (-1)^0 \times (1.0010\ 0110\ 0010\ 1111\ 0000\ 0000\ 0000\ 0000)_2 \times 2^{3D}$

Fraction = 0010 0110 0010 1111 0000 000

Exp = 31 + 127

= 158

$= (10011110)_2$

Thus, the IEEE number is S Exp Fraction

= 0 1001 1110 0010 0110 0010 1111 0000 0000

Scanned with CamScanner

b) -15_{10} to a 16-bit sign-magnitude representation is:

$(1\ 000\ \ 0000\ \ 0000\ \ 1111)_2$

c) -15_{10} to a 16-bit 2's complement representation is:

$|-15_{10}| \rightarrow$ 1111

1's complement $\rightarrow$ 0000

2's complement $\rightarrow$ 0001

$\therefore (0001)_2$

d) a) Z will be 0
N will be 1
C will be 1
X is usually set same as C so its 1.

b) T # will be 0.
S will be 1.

c) Since its higher than 3
I_2 is 0 and I_1 & I_0 will set according to level of interupt.

combine all next time

Problem 2

a) ADD.W $8002, D1
D1 → $0006
Thus ADD.W will add 0002 to 0006
∴ D1 → $0008

b) MOVE.B D3,(A3)+
Move the byte value of D3 to address location of (A3)+1, so A3 shows $8004, the byte will be stored in the $8005.
$8004 → $C005.

c) CLR.L -(A5)
Clears the address preceeding address location of A5.
So A5 represents $800E, thus $800A will be cleared in longword form.
$800A → 0000
$800C → 0000

d) MOVEA.W #$100, A6.
In this instruction, A6 is updated with the immediate hex data of $100 in word size
So, A6 → $0100

Register	Current	New
D0	$A152	
D1	$0006	$0008
D2	$0002	
D3	$0005	
D4	$A6AA	
D5	$8422	
D6	$A124	
D7	$BFD2	

Register	Current	New
A0	$8002	
A1	$800F	
A2	$800A	
A3	$8001	X
A4	$8010	
A5	$800E	X
A6	$8002	$0100 ✓
A7	$8000	

Memory	Current	New
$8000	$A832	
$8002	$B302	
$8004	$C020	$0005
$8006	$800A	
$8008	$0002	
$800A	$BCDE	0000
$800C	$FFFE	0000
$800C	$1022	

	Status Register				
	X	N	Z	V	C
a)	0	1	0	0	0
b)	-	0	0	0	0
c)	-	0	1	0	0
d)	-	-	-	-	-

-4

Question 3)

a) The instruction would be RTS which is return from subroutine and the instruction format is 0100, 1110, 0111, 0101.
The PC & SP will be updated and no other registers.

b)(i) MOVEQ is used to transfer an immediate 8-bit data value to a register using less cycles.
eg) MOVEQ #0, D1
will move the immediate value 0 to D1 lower bit (1 cycle) while if it was MOVE.<W or L> it would transfer <.....0000) to D1 which would take more cycles.

(ii) ADDQ the same logic is used as ADDQ adds the immediate 8-bit data to the destination using less cycles.
eg) ABDQ #1, D1
will add 1 to D1 in 1 cycle(word) while ADD #1,D1 would first select the instruction mode and then transfer the data as 2nd cycle(word).

c) An address register can hold upto 32 bits, but in the MC68000 there are only 24 bits for the address registers are allowed via address/control lines. Thus, the upper 8 bits of address register values are 0.

Question 4)

Address location		
$1000	BEQ	HOME
$1002	ADD.L	D1, D2
$1006	HOME MOVE.W	$6A4, $9500

Machine code for BEQ HOME is:

0110 0111 0000 0100

6 7 0 4

$(670X)_{16}$ -1

Displacement = PC_{ve} - PC_{ve}
= 1006 - 1002
= $04

Machine code for ADD.L D1, D2 is:

Sor Des

1101 001 0 1000 0010

$(D28X)_{16}$ -1

Machine code for MOVE.W $6A4, $9500 is:

Als.W Abs.L

0011 0011 11 11 1000

$(19F8)_{16}$ -2

1958 06A4 9500 -1