Branch : CSE & IT Hinglish

Weekly Test-03

Computer organization and Architecture

Floating point, Micro Operation, Micro program and Control unit

Maximum Marks 15

Q.1 to 5 Carry ONE Mark Each

[MCQ]

1. Assume the following floating-point format

Sign bit	Exponent	Mantisa

The E bits are formatted using excess 16 natation and the give contents are sign = 0, exponent = 10111 and mantissa = 1100100000

(a) 4 (b) 5
(c) 6 (d) 7

[MCQ]

2. Assume a 16 bit $(C4CC)_{16}$ represents floating data with excess-64(explicit normalization) then what is its decimal values ____?

(a) $(-12.75)_{10}$ (b) $(13.75)_{10}$
(c) $(12.85)_{10}$ (d) $(-13.85)_{10}$

[MCQ]

3. Consider the following statements.

S1: The exponent of a double Precision number contains more number of bits compared to exponent of a float.

S2. A double Precision can represent a floating-point number more accurately than a float.

(a) only S1 is true
(b) only S2 is true
(c) Both S1 and S2 are true
(d) Neither S1 nor S2 is true

[NAT]

4. The 2's compliment representation of a 16-bit number (out of 16 bits 1 bit is sign bit and 15 are magnitude) is FFFF. Its magnitude in decimal form will be represented is _______

[MCQ]

5. Match machine-instruction in List-I with respect to micro-instructions in list-II.

List-I	List-II
1. Load R1, a	P: MAR $\leftarrow$ IR (operand address) MDR $\leftarrow$ R1 Memory (MAR) $\leftarrow$ MDR
2. Store a R1	Q: MAR $\leftarrow$ IR (operand address) MDR $\leftarrow$Memory (MAR) R1$\leftarrow$ R1 + MDR
3. Add R1, a	R: MAR $\leftarrow$ IR (operand address) MDR $\leftarrow$Memory (MAR) R1$\leftarrow$ MDR

Codes:

	1	2	3
(a)	P	Q	R
(b)	Q	R	P
(c)	R	P	Q
(d)	Q	P	R

Q.6 to 10 Carry TWO Mark Each

[MCQ]

6. A 16-bit register is used to store a floating data with excess 64 techniques then find
(i) Number of bits required for ‘M’ (Mantissa) field
(ii) Number of bits required for ‘E’ field
(iii) Represent $(-14.75)_{10}$ in the above register and express the values in hexa-decimal.
(a) 8, 7, $(C\ 4\ E\ C)_{10}$
(b) 7, 8, $(C\ 4\ E\ C)_{10}$
(c) 8, 7, $(C\ 4\ C\ C)_{10}$
(d) None of the above

[MCQ]

7. Consider the following hexadecimal form in the IEEE-754 single precision floating point number representation 0XC4EFC000, what is the value represented is represented by it?
(a) (–1900)
(b) (–1915)
(c) (–1916)
(d) (–1918)

[MCQ]

8. What will be the hexadecimal number of a decimal number 52.21875 in IEEE-754 single precision floating point system?
(a) 0×41230000
(b) 0×41200000
(c) $0 \times 42F77000$
(d) None of the above

[MSQ]

9. Choose the correct statement from the following.
(a) The values NaN is used to represent a value that is an error
(b) The result of $\pm 0 \div \pm 0$ is NaN(not a number).
(c) The result of $\pm$ infinity $\div \pm$ infinity is 0.
(d) The result of $\pm$ infinity $\times$ 0 is 0.

[MCQ]

10. Consider the following statements
S1: The minimum and maximum number that can be represented in sing magnitude for signed number is $-(2^{n-1} - 1)$ and $+ (2^{n-1} - 1)$
S2: The minimum and maximum number that can be represented in two’s component for n bit signed number is $-(2^{n-1})$ and $+ (2^{n-1} - 1)$
(a) Only S1 is true
(b) Only S2 is true
(c) Both S1 and S2
(d) Neither S1 nor S2 is true

Answer Key

1. (d)
2. (a)
3. (c)
4. (1)
5. (c)
6. (a)
7. (d)
8. (d)
9. (a, b)
10. (c)

Hints & Solutions

1. (d)

Exponent = $(10111)_2 = (23)_{10}$

Based exponent of the format = 23 – 16 = 7

2. (a)

1	1 0 0 0 1 0 0	1 1 0 0 1 1 0 0
S	E	M

$-0.110011 \times 2^{\pm e}$

-0.110011×2^{4}

-1100.11

$(-12.75)_{10}$

3. (c)

S1(true): In IEEE, exponents bits occupied by double precision are more than the float, hence this statement is true.

S2(true): As double precision has a greater number of bits than float, hence largest number can be more accurately represented.

4. (1)

2's compliment representation of FFFF = $(1111)_2$

$\underset{\text{sign bit}}{1}\ \underbrace{111\ \ 1111\ \ 1111\ \ 1111}_{\text{magnitude bits in 2's compliment form}}$

Magnitude of 2's complement of 111111111111111 is $(000000000000001)_2 = (1)_{10}$

∴ 1 is correction answer.

5. (c)

Machine instruction	Micro-operation
1. Load R1, a	R: MAR ← IR (operand address) MDR ←Memory (MAR) R1← MDR
2. Store a R1	P: MAR ← IR (operand address) MDR ←R1 Memory(MAR) ← MDR
3. Add R1, a	Q: MAR ← IR (operand address) MDR ←Memory (MAR) R1← R1 + MDR

∴ option c is correct.

6. (a)

1. S + E + M = 16

1(sign) + E(Biased Exponent) + m = 16

1 + 7 + M = 16

M = 8

∴ Number of bits in M field is 8 bits.

2. NOTE: Biasing values is also known as excess values.

We know that

$b = 2^{k-1}$

$64 = 2^{k-1}$

Applying log on both sides

$6 = 2^{k-1}$

K = 7

Number of bits in E field is 7 bits.

3. –14.75

Sign bit = 1 (–)

14.75 =1 1 1 0. 1 1

Floating value = 1110.11×2^0

$0.\underbrace{111011}_{M \to 8\text{ bits}} \times 2^4$

1 1 1 0 1 1 0 0

So,

S	E		M	
1	1 0 0	0 1 0 0	1 1 1 0	1 1 0 0
(C		4	E	$C)_{16}$

$(C4EC)_{16}$

7. (d)

1	1 0 0 0 1 0 0 1	1 1 0 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
S	E	M

Exponent = 137 – 127 = 10

∴ number will be

$-1.110111111 \times 2^{+10}$

$-1110111111 \times 2^{+10} \times 2^{-9}$

$= -959 \times 2$

$= -1918$

∴ D is correct

8. (d)

Given, $(52.21875)_{10} = (110100.00111)_2$

1.1010000111×2^5

Exponent = 5 + 127 = 132

Mantissa : 1010000111

Stored exponent = sign bit = 1

01000010010100001110000000000000

$\therefore$ 0 × 4250E000

$\therefore$ option (d) is correct.

9. (a, b)

(a) True: The value NaN is used to represent a value that is an error.

(b) True: The result of ± 0 ÷ ± 0 is NaN

(c) False : The result of ± infinity ÷ ± infinity is ± infinity

(d) False : The result of ± infinity × 0 is NaN.

10. (c)

We known that

The range of sign magnitude number is

$-(2^{n-1} - 1)$ to $+ (2^{n-1} - 1)$

True: The range of two's components is

$-(2^{n-1})$ to $+ (2^{n-1} - 1)$

$\therefore$ Option c is correct.

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