

# 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	Mantissa
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The E bits are formatted using excess 16 notation 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
- Number of bits required for 'M' (Mantissa) field
  - Number of bits required for 'E' field
  - Represent  $(-14.75)_{10}$  in the above register and express the values in hexa-decimal.
- 8, 7, (C 4 E C)<sub>10</sub>
  - 7, 8, (C 4 E C)<sub>10</sub>
  - 8, 7, (C 4 C C)<sub>10</sub>
  - 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?
- (-1900)
  - (-1915)
  - (-1916)
  - (-1918)

## [MCQ]

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

## [MSQ]

9. Choose the correct statement from the following.
- The values NaN is used to represent a value that is an error
  - The result of  $\pm 0 \div \pm 0$  is NaN(not a number).
  - The result of  $\pm \text{infinity} \div \pm \text{infinity}$  is 0.
  - The result of  $\pm \text{infinity} \times 0$  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  $+(2^{n-1} - 1)$
- Only S1 is true
  - Only S2 is true
  - Both S1 and S2
  - 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)

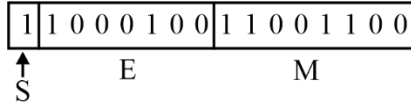
## Hints & Solutions

1. (d)

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

$$\text{Based exponent of the format} = 23 - 16 = 7$$

2. (a)



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

$$-0.110011 \times 2^4$$

$$-1100.11$$

$$(-12.75)_{10}$$

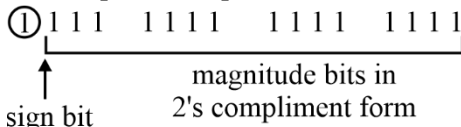
3. (c)

**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 complement representation of FFFF = (1111)<sub>2</sub>



Magnitude of 2's complement of 1111111111111111 is (0000000000000001)<sub>2</sub> = (1)<sub>10</sub>

∴ 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)

$$1. S + E + M = 16$$

$$1(\text{sign}) + E(\text{Biased Exponent}) + m = 16$$

$$1 + 7 + M = 16$$

$$M = 8$$

∴ 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 (-)

$$14.75 = 1110.11$$

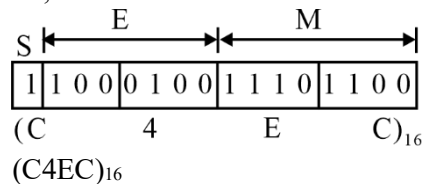
$$\text{Floating value} = 1110.11 \times 2^0$$

$$0.111011 \times 2^4$$

M → 8 bits

$$11101100$$

So,



7. (d)



$$\text{Exponent} = 137 - 127 = 10$$

∴ number will be

$$-1.11011111 \times 2^{+10}$$

$$-111011111 \times 2^{+10} \times 2^{-9}$$

$$= -959 \times 2$$

$$= -1918$$

∴ D is correct

8. (d)

Given,  $(52.21875)_{10} = (110100.00111)_2$   
 $1.1010000111 \times 2^5$   
 Exponent =  $5 + 127 = 132$   
 Mantissa : 1010000111  
 Stored exponent = sign bit = 1  
 01000010010100001110000000000000  
 $\therefore 0 \times 4250E000$   
 $\therefore$  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  $\pm 0 \div \pm 0$  is NaN
- (c) False : The result of  $\pm \text{infinity} \div \pm \text{infinity}$  is  $\pm \text{infinity}$
- (d) False : The result of  $\pm \text{infinity} \times 0$  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.



For more questions, kindly visit the library section: Link for web: <https://smart.link/sdfez8ejd80if>



PW Mobile APP: <https://smart.link/7wwosivoicgd4>