

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

III B.Tech II Sem. I Mid-Term Examinations, Feb. – 2009

## COMPUTER ORGANIZATION

## Objective Exam

Name: \_\_\_\_\_ Hall Ticket No. \_\_\_\_\_

**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 20.****I. Choose the correct alternative:**

1. What is the 16-bit sign magnitude representation of the 8-bit sign-magnitude quantity  $(10000111)_2$  [      ]
  1. 10000000 00000111
  2. 11111111 10000111
  3. 11111111 00000111
  4. 00000000 10000111
2. N-bit sign magnitude numbers can represent quantities from [      ]
  1.  $-(2^{(n-1)}-1)$  to  $+(2^{(n-1)})$
  2.  $-(2^{(n-1)}-1)$  to  $+(2^{(n-1)}-1)$
  3.  $-(2^n-1)$  to  $+(2^n-1)$
  4.  $-(2^n-1)$  to  $+2^n$
3. What is the value of the exponent represented by an exponent field of 1110 0010 in IEEE 754 single-precision floating-point number? [      ]
  1. 226
  2. 99
  3. 53
  4. 98
4. The corresponding logic microoperation to clear the bits in A where there are corresponding 0's in B is [      ]
  1.  $A \wedge B$
  2.  $A \vee B$
  3.  $A \wedge B'$
  4.  $A' \wedge B$
5. An arithmetic shift left \_\_\_\_\_ a signed binary number by 2 [      ]
  1. Multiplies
  2. Divides
  3. Adds
  4. Subtracts
6. The logic for even parity bit generation for a 3 bit message xyz is [      ]
  1.  $x'y'z+xy'z+xy'z'+xyz$
  2.  $xyz$
  3.  $x'y'z$
  4.  $(xyz)'$
7. A computer uses a memory unit with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part. How many bits are there in the operation code, the register code part, and an address part? [      ]
  1. 7,6,18
  2. 7,6,8
  3. 6,7,8
  4. 7,7,8
8. The sequence of events that happen during a typical fetch operation is [      ]
  1.  $PC \rightarrow MAR \rightarrow MEMORY \rightarrow MDR \rightarrow IR$
  2.  $PC \rightarrow MEMORY \rightarrow MDR \rightarrow IR$
  3.  $PC \rightarrow MEMORY \rightarrow IR$
  4.  $PC \rightarrow MAR \rightarrow MEMORY \rightarrow IR$
9. Which of the following rules regarding the addition of 2 given numbers is correct, if negative numbers are represented in 2's complement form? [      ]
  1. Add sign bit and discard carry, if any
  2. Add sign bit and add carry, if any
  3. Don't add sign bit and discard carry, if any
  4. Don't add sign bit and add carry, if any

10. A certain machine uses expanding opcode. It has 16-bit instructions and 6-bit addresses. It supports one address and two address instructions only. If there are 'n' two address instructions, the maximum number of one address instruction is [      ]
1.  $2^{16-n}$       2.  $2^{10-n}$       3.  $(2^4-n) \times 2^6$       4.  $2^{10}$

## II. Fill in the Blanks:

1. A common bus for eight registers of 16 bits each requires \_\_\_\_ number of multiplexers.
2. Programming in a language that actually controls the path of signals or data within the computer is called \_\_\_\_\_.
3. The operations executed on data stored in registers are called \_\_\_\_\_.
4. the decimal equivalent of the binary number 101.101 is \_\_\_\_\_.
5. The infix notation for reverse polish expression ABCDE+\*-/ is \_\_\_\_\_.

## III. True or False statements:

1. 2's complement notation has only one representation for zero. [True/False]
2. A microprogrammed control unit is faster than a hard-wired control unit. [True/False]
3. Instructions in a RISC machine take multiple cycles. [True/False]
4. The number of addressing modes is more in RISC than in CISC. [True/False]
5. It is easier to implement a new instruction in hard-wired control unit than in micro programmed control unit. [True/False]

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**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 20.****I. Choose the correct alternative:**

1. What is the 8-bit 2's complement of -12 [      ]  
1. 1111 0100      2. 1000 1100      3. 0000 0100      4. 0000 0011
2. Minimum number of bits required to represent  $(1497)_{10}$  as an unsigned binary integer is [      ]  
1. 10      2. 11      3. 16      4. 32
3. A common-bus for eight registers of 16 bits each requires, \_\_\_\_\_ number of multiplexers. [      ]  
1. 16      2. 8      3. 256      4. 4
4. Which logic operation can be used to selectively complement bits of a register? [      ]  
1. OR      2. XOR      3. AND      4. COMPLEMENT
5. An arithmetic shift right \_\_\_\_\_ the number by 2 [      ]  
1. Multiplies      2. Divides      3. Increments      4. Decrements
6. An arithmetic shift left \_\_\_\_\_ a signed binary number by 2 [      ]  
1. Multiplies      2. Divides      3. Adds      4. Subtracts
7. The logic for odd parity bit generation for 3-bit message xyz is [      ]  
1.  $x'y'z'+x'yz+xy'z+xyz'$       2. xyz      3.  $x'y'z'+x'yz$       4.  $x'y'z'$
8. In a 11-bit computer instruction format, the size of address field is 4 bits. The computer uses expanding opcode technique and has 5 two-address instructions and 32 one address instructions. The number of zero address instructions it can support is [      ]  
1. 256      2. 2048      3. 16      4. 272
9. word 20 contains 40  
word 30 contains 50  
word 40 contains 60  
word 50 contains 70  
Which of the following instruction, loads 60 into the accumulator? [      ]  
1. Load immediate 60      2. Load direct 30      3. Load direct 20      4. Load indirect 30
10. Programming in a language that actually controls the path of signals or data within the computer is called [      ]  
1. microprogramming  
2. systems programming  
3. assembly language programming  
4. machine language programming

**II. Fill in the Blanks:**

11. The symbolic notation used to describe the micro operation transfers among registers is called \_\_\_\_\_.
12. A control unit whose binary control variables are stored in memory is called \_\_\_\_\_ control unit
13. The  $r$ 's complement of an  $n$ -digit number  $N$  in base  $r$  is \_\_\_\_\_.
14. The infix notation for reverse polish expression  $ABCDE+*-/$  is \_\_\_\_\_
15. The 9's complement of BCD (1001) is \_\_\_\_\_.

**III. True (or) False statements:**

16. A microprogrammed control unit facilitates easy implementation of a new instruction than a hard-wired control unit [True/False]
17. An index register in a digital computer is used for pointing to the stack addresses. [True/False]
18. Multiplexing of data and address lines in a microprocessor reduces the instruction execution time. [True/False]
19. Efficient pipelining is a characteristic of RISC architecture. [True/False]
20. Register indirect mode does not require memory access. [True/False]

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Hall Ticket No. \_\_\_\_\_

**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 20.****I. Choose the correct alternative:**

1. What is the 16-bit sign extension of the 8-bit 2's complement quantity 1001 0010? [     ]  
 1. 1111 1111 1001 0010      2. 0000 0000 1001 0010  
 3. 1001 0010 0000 0000      4. 1000 0000 0001 0010
2. If  $(123)_5 = (x3)_y$ , then the number of possible values of x is [     ]  
 1. 4      2. 1      3. 3      4. 2
3. A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers. How many selection inputs are there in each multiplexer? What size of multiplexers are needed? How many multiplexers are there? [     ]  
 1. 4, 16x1,32      2. 2,16x1,32      3. 4,8x1,16      4. 2,8x1,16
4. Which logic operation can be used to selectively set bits of a register? [     ]  
 1. OR      2. AND      3. Complement      4. XOR
5. An overflow occurs after an arithmetic shift left of register R if [     ]  
 1.  $R_{n-1} \oplus R_{n-2} = 1$       2.  $R_{n-1} \oplus R_{n-2} = 0$   
 3.  $R_{n-1} + R_{n-2} = 1$       4.  $R_{n-1} + R_{n-2} = 0$
6. Which of the following 4-bit numbers equals its complement? [     ]  
 1. 1010      2. 1000  
 3. No such number exists      4. 0101
7. Suppose a system is evolved by extraterrestrial creatures having only 3 fingers. They use the figures 0,1,2 with  $2 > 1 > 0$ . What will be the binary equivalent of 222 in this system? [     ]  
 1. 101010      2. 11000      3. 10110      4. 11010
8. A decimal number has 25 digits. The number of bits needed for its equivalent binary representation is approximately. [     ]  
 1. 50      2. 60      3. 70      4. 75
9. Floating point numbers in a computer are represented by a 10-bit mantissa (including a sign bit) and a 6-bit exponent (including a sign bit). The approximate value of the maximum number that can be represented is (assume the mantissa is stored in normalized form) [     ]  
 1.  $2^{64}$       2.  $2^{63}$       3.  $2^{32}$       4.  $2^{31}$

10. An index register in a digital computer is used for [     ]
1. pointing to the stack address
  2. indirect addressing
  3. keeping track of number of times a loop is executed
  4. address modification

**II. Fill in the Blanks:**

11. The number of logic operations that can be performed with 2 binary variables is \_\_\_\_.
12. In BCD addition, when the binary sum is greater than 1001, then addition of \_\_\_\_ converts the binary sum to correct BCD representation
13. The 9's complement of BCD (0111) is \_\_\_\_.
14. The address of the next instruction is stored in \_\_\_\_.
15. The implicit operand in single accumulator organization is \_\_\_\_.

**III. True/False statements:**

16. An error detection code can also correct errors. [True/False]
17. A division operation cannot result in an overflow of quotient [True/False]
18. Booth's multiplication algorithms is for unsigned numbers only [True/False]
19. Variable-length instructions is the characteristic of RISC architecture [True/False]
20. Two-address instructions result in short programs than three-address instructions [True/False]

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Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 20.

## I. Choose the correct alternative:

1. An n-bit 2's complement number can represent values \_\_\_\_\_ [      ]  
 1.  $-(2^{(n-1)})$  to  $+(2^{(n-1)}-1)$       2.  $-(2^{(n-1)}-1)$  to  $+(2^{(n-1)})$   
 3.  $-(2^n-1)$  to  $+(2^n-1)$       4.  $-(2^n-1)$  to  $+2^n$
2. The binary equivalent of the decimal number 0.4375 is [      ]  
 1. 0.0111      2. 0.1011      3. 0.1100      4. 0.1010
3. (10110 01110 00111 10000) in base 32 is [      ]  
 1. 22 14 7 16      2. 11 9 23 31  
 3. 11 9 7 16      4. 11 14 23 16
4. In a 4-bit arithmetic circuit, the output is calculated from the following arithmetic sum  
 $D=A+Y+C$  in Where A and Y are 4-bit binary numbers and Cin is the input carry. When  $C_{in}=0$   
 and all 1's are inserted into Y inputs, then the output is [      ]  
 1.  $A+1$     2.  $A-1$     3.  $A'$     4.  $A$
5. What is the corresponding logic microoperation for selectively clearing bits in a register A  
 (i.e., clear to 0 the bits in A only where there are corresponding 1's in B) [      ]  
 1.  $A \wedge B$       2.  $A \wedge B'$       3.  $A \vee B$       4.  $A \oplus B$
6. Which of the following 4-bit number equals it's 2's complement [      ]  
 1. 1010      2. 0101  
 3. 1000      4. no such number exists

## Answer questions 7-10 from the following information

In single –precision IEEE 754 standard 8 bits are for exponent, 23 bits for fraction and 1 bit is for sign, which contains the sign of the fraction field .The fraction field is a sign-magnitude number that represents the fractional portion of a binary number whose integer portion is assumed to be one. The exponent field uses a biased integer representation in which a fixed bias (127) is added

7. What is the value of the exponent represented by an exponent field of 11100010 in this format? [      ]  
 1. 226      2. 127      3. 99      4. 98
8. What is the fraction field of the single-precision floating point representation of 6.25? [      ]  
 1. 1001 0000 0000 0000 0000 0000    2. 1100 1000 0000 0000 0000 0000  
 3. 0000 0000 0000 0000 0000 1001    4. 0000 0000 0000 0000 1100 1000

9. What is the value of the fraction represented by fraction field of 1100 0000 0000 0000 0000 in this format [      ]  
 1. 1.75      2. 0.75      3. 0.12      4. 1.12
10. Micro program is [      ]  
 1. Name of source program in micro computer  
 2. The set of instructions indicating a primitive operation in a system  
 3. Primitive form of macros used in assembly language programming  
 4. Program of very small size

## II. Fill in the Blanks:

11. A common bus for k registers of n bits each using three state buffers require \_\_\_ number of buffers.
12. The total number of possible Boolean functions involving 'n' Boolean variables is \_\_\_\_\_
13. The register that holds the address for the stack is called \_\_\_\_\_
14. The implied operand of an operation in a single accumulator organization is \_\_\_\_\_
15. A memory that is part of a control unit is referred to as a \_\_\_\_\_

## III. True or False statements:

16. Computer based on the RISC architecture use hard-wired control rather than a control memory with a micro programmed control unit [True/False]
17. Hard-wired control unit is flexible than micro-programmed control unit [True/False]
18. Overflow can occur during multiplication of numbers [True/False]
19. Booths algorithm is for division of numbers [True/False]
20. RISC machines use relatively large number of registers in the processor unit. [True/False]