CS 33: COMPUTER ORGANIZATION

Computer Science Department
University of California, Los Angeles

Dr. John A. Rohr
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EXAMINATION I

CLOSED BOOK

Answer each of the following questions on the answer sheet provided. The point value for each question is given in parentheses before the question number. There are a total of 100 points on the examination. All numbers are decimal integers unless otherwise indicated in a specific problem.

Only the answers on the answer sheet will be graded. Every numerical answer is either completely correct or wrong. No partial credit will be given on numerical problems. If a problems specifies operands with a given bit width, the result must have the same number of bits or it will be incorrect.

(2) 1. What are the four major components of von Neumann computer architecture?

(2) 2. What are the three major sections of a Central Processing Unit (CPU)?

(2) 3. What is the purpose of the Program Counter in a computer CPU?

(2) 4. What is the purpose of the Instruction Register in a computer control unit?

(2) 5. What is the hardware function for Register 31 in a MIPS processor?

(2) 6. What is the purpose for the set instructions in a MIPS processor?

(2) 7. What is the address mode for branch instructions?

(2) 8. What is usually the first operand in a MIPS assembly language instruction?

(2) 9. What is the difference between an assembler and a compiler?

(2) 10. What are the primary function of Pass 2 in a two-pass assembler?

(4) 11. Convert the unsigned decimal number 145 to binary.

(4) 12. Convert the unsigned hexadecimal number 3039 to decimal.

(4) 13. Convert the unsigned decimal number 2842.125 to octal.

(4) 14. Convert the unsigned 21-bit octal number 3726355 to 20-bit hexadecimal.

(4) 15. Convert the decimal number -16657 to 32-bit two's-complement hexadecimal.

(4) 16. Generate the negative of the 16-bit two's-complement hexadecimal number 415213.

(4) 17. Add the unsigned 8-bit binary numbers: 0011 1010 + 1000 1001.

(4) 18. State whether or not the calculation in the problem above generates an **overflow.**

(4) 19. Add the unsigned 24-bit hexadecimal numbers: FEDCBA + D01133.

(4) 20. State whether or not the calculation in the problem above generates an **overflow.**

(4) 21. Add the two's-complement 24-bit hexadecimal numbers: 654321 + 7987BD.

(4) 22. State whether or not the calculation in the problem above generates an **overflow**.

(4) 23. Add the two's-complement 18-bit octal numbers: 122457 + 531642.

(4) 24. State whether or not the calculation in the problem above generates an **overflow**.

(4) 25. Subtract the two's-complement 24-bit hexadecimal numbers: 654321 - 867843.

(4) 26. Subtract the two's-complement 8-bit binary numbers:
0110 1010 - 1010 0111.

(4) 27. Compute the **AND** of the 16-bit hexadecimal numbers: BFEF **AND** ABFD.

(4) 28. Compute the **OR** of the 18-bit octal numbers: 254120 **OR** 410201.

(4) 29. Compute the **XOR** (Exclusive-Or) of the 16-bit hex numbers: DEED **XOR** 1413.

(4) 30. Compute the **NOR** of the 8-bit binary numbers: 1011 0001 **NOR** 0010 1000.

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EXAMINATION I ANSWER SHEET

1. input, CPU, output, program and data memory
2. ~~CU, ALU, Registers~~ control unit, arithmetic logic unit, register file
3. keeping track of current line of instruction
4. ~~loading single lines of instructions for use~~ hold bits
5. ~~It is the program counter~~ hold func. call return address
6. changing values of a registers to a desired value Compare numeric values
7. base counter relative
8. destination
9. compiler converts high level language to assembly language
   assembler generates object code from assembly language
   generate binary machine code
10. ~~Messages making and loading into memory~~

11. 1001 0001	16. BEADED	21. DECADE	26. 1100 0011
12. 12345	17. 1100 0011	22. yes	27. ABED
13. 54321 | 1101	18. no	23. 654321	28. 654321
14. FACED	19. CEEDED	24. no	29. CAFE
15. FFFFBEEF	20. yes	25. DECADE	30. 0100 0110

Good!