



Your Name: _____

This exam has a total of 100 points possible. All questions are worth 1 point each unless otherwise noted.

For the true / false and multiple choice questions, please circle the letter of your answers, e.g.:

Ex. 1:

T/F: Computer Science is an interesting and challenging topic.

Ex. 2:

The topic of Computer Science is:

a) Killer b) Awesome c) Bogus d) Interesting & challenging



Good luck!

11. [3 points] $532_8 = ?_{16}$ (Show all steps, circle final answer).

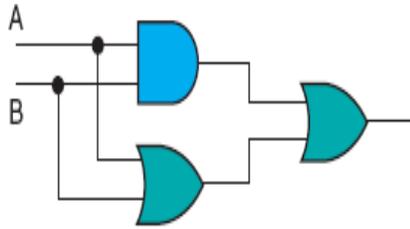
12. [3 points] $111011_2 + 11101_2 = ?_2$ (Show all steps, circle final answer).

13. [7 points] $1B_{16} - 53_8 = ?_{10}$

(Convert the two values given to 8B2C, changing the subtraction to addition, then perform a binary addition, then convert the final 8B2C answer back to base 10).

Show all steps, circle final answer.

14. [10 points] Give the Boolean expression and truth table for the following circuit diagram:



15. [4 points]: Computing Components

Write the letter corresponding to the best match for each answer below:

- Performs arithmetic and Boolean operations
- Stores data in addressable cells
- Used to transfer data between components
- Very fast memory cells that live inside the CPU
- Provides a means to read values from outside world
- Provides a means to write values to the outside world
- Defines the type of each instruction
- Specifies the data for instructions

- A. OPERAND
- B. BUS
- C. ALU
- D. OUTPUT
- E. REGISTERS
- F. OPCODE
- G. INPUT
- H. MEMORY UNIT

16. [4 points]: The Fetch-Execute Cycle

Write the letter corresponding to the best match for each answer below:

- Examines the IR register to see what actions the CPU should perform for the current instruction.
- Performs the actions specified by the current instruction in the IR register.
- Copies the next instruction to be executed from the Memory Unit to the IR register, over the BUS.
- Loads the instruction operand into the CPU (if needed).

- A. Decode
- B. Get Data
- C. Execute
- D. Fetch

17. [6 points] Assuming a memory unit where each memory location contains one byte of data, how many bytes of memory could be addressed by each of the following memory address sizes? Give each answer using “Decimal Exponent Prefixes”, e.g. “16 megabytes”.

a) A 37 bit memory address

b) A 54 bit memory address

18. [4 points] Circle all of the programming constructs found in the following lines of code:

```
account_balance = get_account_balance();
```

a) Declaration b) Assignment c) Selection d) Repetition e) Sub-program Call

19. [4 points] Circle the letter of all of the programming constructs found in the following lines of code:

```
while (counter > 0)
{
    var account_balance = account_balance + increase;
    counter = counter - 1;
}
```

a) Declaration b) Assignment c) Selection d) Repetition e) Sub-program Call

20. [6 points] Circle the letter of all of the programming constructs found in the following lines of code:

```
if (account_balance < 1000)
{
    account_balance = account_balance + calc_balance_increase(account_balance);
}
```

a) Declaration b) Assignment c) Selection d) Repetition e) Sub-program Call

Pep/8 Machine Language

Address (hexadecimal)	Contents (hexadecimal)
0001	12
0002	8E
0003	35
0004	23
0005	34
0006	67
0007	81
0008	7C
0009	26
000A	35

Answer the following questions given the state of the memory unit above. All values are given in hexadecimal, and any numbers within your answers must be given in hexadecimal. You do not need to write the base subscript in your answers.

21. What is the 1 byte value starting at address 0003? _____

22. What is the 2 byte value starting at address 0004? _____

23. What would the Pep/8's "A" register contain after reading the value starting at address 0002? _____

24. [3 points] Write the 3-byte Pep/8 Machine Language instruction that sets the A register to 817C using the "immediate" mode addressing mode:

25. [3 points] Write the 3-byte Pep/8 Machine Language instruction that sets the A register to 817C using the "direct" mode addressing mode:

26. [3 points] What four digit hex value will the A register contain after the execution of the following Pep/8 instruction? _____

C0 00 06

27. [3 points] What four digit hex value will the A register contain after the execution of the following Pep/8 instruction? _____

C1 00 06

Pep/8 Assembly Language

Address (hexadecimal)	Contents (hexadecimal)
0001	14
0002	8E
0003	37
0004	23
0005	34
0006	7A
0007	79
0008	7B
0009	23
000A	35

Answer the following questions given the state of the memory unit above. All values are given in hexadecimal, and any numbers within your answers must be given in hexadecimal. You do not need to write the base subscript in your answers.

28. [2 Points] What four-digit hex value will the A register contain after the execution of the following Pep/8 assembly language instruction? _____

```
LDA 0x0004,i
```

29. [2 Points] What four-digit hex value will the A register contain after the execution of the following Pep/8 assembly language instruction? _____

```
LDA 0x0004,d
```

30. [2 Points] Write the Pep/8 assembly language instruction that would set the A register to the value 3723, using immediate addressing mode:

31. [2 Points] Write the Pep/8 assembly language instruction that would set the A register to the value 3723, using direct addressing mode:

32. [2 Points] Write the Pep/8 assembly language instruction that would add 7B23 to the current value in the A register, using direct addressing mode:

33. [10 Points] Networks

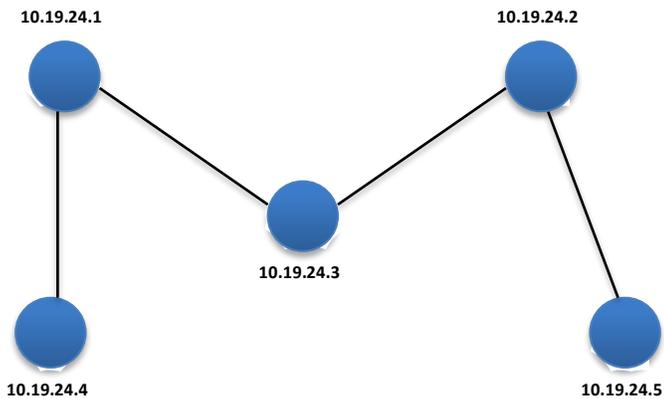
Write the letter corresponding to the best match for each answer below:

- Local Area Network
- Wide Area Network
- Set of rules that define how data is transferred on a network.
- LAN protocol.
- WAN protocol.
- LAN traffic director.
- WAN traffic director.
- LAN node identifier.
- WAN node identifier.
- Types of TCP packets used to transfer data reliably on a WAN.

- A. Router
- B. MAC Address
- C. DAT, ACK & NAK
- D. Ethernet
- E. Protocol
- F. LAN
- G. IP
- H. IP Address
- I. Switch
- J. WAN

34. [5 Points] Networks (EXTRA CREDIT)

Given the logical WAN networking diagram below, populate the **Neighbor / Connection Table** and **Routing Table** (below) for router **10.19.24.3** such that this router can send data packets to every other router in the diagram. Reminders: The Neighbor / Connection table has a **single** IP address per line. The Routing Table has a **pair** of space-separated IP addresses per line.



10.19.24.3 Neighbor / Connection Table

10.19.24.3 Routing Table