CIS-350 INFRASTRUCTURE TECHNOLOGIES

Study Guide for Test 1

Closed book, closed notes. You may use a calculator only for calculations. You may have a "cheat sheet", i.e., an index card 3"×5" filled up on <u>one</u> side with anything you want. The other side of the card should be blank. You need to turn this card with the test.

Materials covered:

(1) <u>Chapters 1-6</u> to the extent they were covered in class or assigned explicitly for reading. For chapters 1, 2, 4, and 6 you need to know the lecture notes posted on BB as well as the textbook material. For chapters, 3 and 5 you may rely exclusively on the lecture notes. Reading of these two chapters is not required.

(2) Please also review <u>Homeworks 1, 2, and 3</u> as well as <u>In-class Small Group Activities 1, 2, and 3</u>. The solutions for Homeworks and In-class Activities are posted in the Course Documents folder on BB.

Test format:

(1) Multiple choice questions on all the mentioned material, similar to those in Homework 1.
(2) Short essay questions, similar to those in Homework 1. Also, look at the Reading Review Questions and Exercises following chapters 1, 2, 4, and 6.
(3) Short numerical problems to work, similar to those in Homeworks 2 and 3 and In-class Small Group Activities 1 and 2.
(4) Fill in blanks, similar to those in Homework 1, and matching. Memorize the description of the keywords (those in bold) used in text.
(5) Simple programs to write/analyze in the LMC assembly language like in Homework 3 and In-class Small Group Activity 3.

Sample Test 1

<u>I. MC, T/F, and fill in blanks questions</u>.

1. What entity do the following abbreviations describe? Fill in the blanks with the appropriate brief description.

a. 2 GB DDR2 SDRAM   _____
b. 16 × DVD ±RW   _____
c. TCP/IP or HTTP   _____
d. IBM z/OS or Sun Solaris   _____
e. What digits does the octal system use?   _____
f. Four bytes contains _____ bits.
g. In a floating point number, the term *underflow* refers to _____
_____
_____

h. The most significant bit (the most leftmost bit) in a signed number represents
_____

2. A bundle of wires that can carry signals, power, data, commands, and instructions is called a _____.
a. channel
b. bus
c. interface unit
d. communication channel
e. protocol

3. A 2GB memory has exactly _____ bytes.
a. 4,000,000,000
b. 4,294,967,296
c. 2,147,483,648
d. 4,194,304
e. 1,073,741,824

4. 107374182400 bytes is exactly _____.
a. 100GB
b. 10GB
c. 10TB
d. 1TB
e. 4TB

5. The _____ contains the most important operating system processing functions.
a. application programming interface
b. user interface
c. file management system
d. I/O driver
e. kernel

6. The _____ stored in ROM loads the remainder of the operating system from disk or network into RAM.
a. application program
b. bootstrap program
c. IPO program
d. embedded program
e. virtual program

7. In the concept of _____ computing, each computer can do part of the processing for higher overall efficiency.
a. open
b. closely-coupled
c. loosely-coupled
d. distributed
e. shared

8. In batch systems, a job consisted of card _____, together with the required _____ for each program (Fill in)

9. What fact made the Unix operating system portable? _____

10. The links between the components of a system must be physical (True/False). _____

11. The diagram of a system drawn on paper is very often an abstraction of the real system (True/False). _____

12. The idea that the program instructions and data are both stored in memory while being processed is known as the _____.
a. stored program concept
b. application programming interface
c. user interface
d. distributed computing
e. graphical user interface

13. To simplify analysis, understanding, and maintenance of a system, one can decompose the system into _____.
a. clients
b. servers
c. subsystems
d. peers
e. procedures

14. Anything outside the boundary a system represents the _____ that the system operates or presents itself within.
a. interface
b. component
c. linkage
d. environment
e. module

15. The relationship between a client and a server in the client-server model can be 1 to 1, 1 to many, or many to many (True/False). _____

16. How many computers would typically be involved in a four-tier architecture? _____

17. The problem of solving incompatibilities between the application software residing on different computers which have to work together is often assigned to special software called _____.
a. operating system
b. application program
c. I/O drivers
d. middleware
e. shared server

18. The different types of "*n*-tier architectures" mainly concern distributing the processing load among *n* computers involved (True/False). _____

19. Google is always eager to reveal the details about the infrastructure technologies that it uses (True/False). _____

20. To store a string "*Madam*" in ASCII or EBCDIC, the computer would use _____ bytes. (Do not count "s.)
a) 1 byte   b) 5 bytes   c) 10 bytes   d) 15 bytes

21. Assume that some older computers used a 10-bit word to store numbers. The decimal <u>range</u> for this word size for unsigned numbers is _____.
a) [0,1023]   b) [0,511]   c) [0,255]   d) [-512,511]

22. An image has a resolution of 800x1200 pixels. Assuming that each pixel would consume 2 bytes, this image would use _____ bytes of storage.
a) 960,000   b) 1,920,000   c) 2,880,000   d) 3,840,000

23. _____ images are made up of lines and curves that can be defined mathematically.
a) bit map   b) object/vector   c) pixel   d) compressed

24. The ISA, USB, PCI, AGP or SCSI are the names of popular _____ used in contemporary computers.
a) device drivers   b) motherboard   c) interrupt lines   d) buses/interfaces

25. If $(-9)_{10}$ is supposed to be stored in 1 byte (8 bits), it is represented in the computer in the following 2's complement form:
a) 00001001   b) 11110111   c) 11110110   d) 11111111

26. In the LMC, where does the little man find the address of the next instruction to execute?
a. in the mailboxes   b. in the in-basket   c. in the calculator
d. in the instruction location counter   e. in the out-basket

27. Which of the following arithmetic instructions in <u>not</u> in the LMC instruction set?
a. SUB   b. MUL   c. ADD

28. How many instructions are in the instruction set of the LMC computer introduced in the Englander's textbook?
a. about 50   b. about 10   c. about 100   d. about 150

29. In the LMC instructions IN (901) and OUT (902), 01 and 02 represent the addresses of _____.
a. input device and output device, respectivelyb. memory locations
c. accumulators   d. calculators

30. In the LMC instruction BRP 25, the branch to the instruction at address 25 is executed when the contents of the Accumulator is _____. (choose the most precise answer)
a. <0   b. >0   c. ≥0   d. =0   e. ≤0

31. In the LMC computer, the Little Man acts as (the) _____.
a. memory   b. I/O interface   c. ALU
d. control unit   e. program counter

II. <u>Make the following conversions</u>. (If you need help with the Octal and Hex charts, see the middle of the page.) Do not use a calculator that provides direct conversion. Assume <u>unsigned</u> binary numbers.

a. Change $(BE7)_{16}$ to Binary form.

b. Change $(11010111)_2$ to Octal form.

c. Change $(11101001)_2$ to Decimal form.

d. Change $(772)_8$ to Hexadecimal form.

e. Change $(27.625)_{10}$ to Hexadecimal.

Octal	Binary	Octal	Binary	Hex	Binary	Hex	Binary
0	000	4	100	0	0000	8	1000
1	001	5	101	1	0001	9	1001
2	010	6	110	2	0010	A	1010
3	011	7	111	3	0011	B	1011
				4	0100	C	1100
				5	0101	D	1101
				6	0110	E	1110
				7	0111	F	1111

III. <u>Essay questions</u>

See the homeworks and Reading Review Questions and Exercises following chapters 1, 2, 4, and 6.

IV. <u>Fill in blanks</u>

1. In an instruction *STO 80*, an *80* is an _____ and *STO* is an _____.

V. Write the LMC program which reads in two numbers (one at a time); places them in memory locations 50 and 51, respectively; calculates their positive difference; places this difference in memory locations 52; and writes the result (difference) out.

VI. In the LMC program below, determine the contents of the Program Counter (PC) before and after each instruction is executed. Also determine the contents of the Out-basket, Accumulator (A); and memory locations 60, 61, and 62 after each instruction is executed. Note that some instructions may not be executed. Also, note that memory locations 60, 61, and 62 have been initialized with 15, 15, and 10, respectively.

Address	Instruction	PC	OUT	A	60	61	62
00	LDA 60	00 → 01	____	____	____	____	____
01	ADD 62	_____	____	____	____	____	____
02	STO 61	_____	____	____	____	____	____
03	BRP 05	_____	____	____	____	____	____
04	BR 01	_____	____	____	____	____	____
05	OUT	_____	____	____	____	____	____
06	HLT	_____	____	____	____	____	____
…….							
…….							
60	15						
61	15						
62	10						

Answers

<u>I.</u>

1. What entity do the following abbreviations describe? Fill in the blanks with the keyword(s).

a. Main/primary memory

b. Digital video disc

c. Internet protocols

d. Operating systems

e. 0 through 7 only

f. 32.

g. In a floating point number, the term *underflow* refers to the region of vey very small positive and negative numbers which cannot be represented by the type float or double (or any other type) in the computer. Simply, these numbers are too small to be stored.

h. The most significant bit (the most leftmost bit) in a signed number represents the sign of the number and also contributes to the magnitude of the number.

2. bus

3. 2,147,483,648

4. 100GB

5. kernel

6. bootstrap program

7. distributed

8. True

9. Written in C language

10. False

11. True

12. stored program concept

13. subsystems

14. environment

15. True

16. 4

17. middleware

18. True

19. False

20. 5 bytes

21. [0,1023]

22. 1,920,000

23. object/vector

24. buses/interfaces

25. 11110111

26. in the instruction location counter

27. MUL

28. about 10

29. input device and output device, respectively

30. ≥ 0

31. control unit

II.

a. $(BE7)_{16} = (101111100111)_2$

b. $(11010111)_2 = (327)_8$

c. $(11101001)_2 = (233)_{10}$

d. $(772)_8 = (1FA)_{16}$

e. $(27.625)_{10} = (1B.A)_{16}$

IV.

1. operand (or address), operation code (opcode)

V.

    00 IN
    01 STO 50
    02 IN
    03 STO 51
    04 SUB 50
    05 BRP 08
    06 LDA 50
    07 SUB 51
    08 STO 52
    09 OUT
    10 HLT

VI.

Address	Instruction	PC	OUT	A	60	61	62
00	LDA 60	00 → 01	?	15	15	15	10
01	ADD 62	01 → 02	?	25	15	15	10
02	STO 61	02 → 03	?	25	15	25	10
03	BRP 05	03 → 05	(branch is executed as A=25≥0)				
04	BR 01	This instruction is skipped					
05	OUT	05 → 06	25	25	15	25	10
06	HLT	06 → 06	same as above or all 0s				
		or					
		06 → 00					
…….							
…….							
60	15						
61	15						
62	10						