Semester 2 2016
FIT 1047 Sample Exam Questions

Faculty of Information Technology

Note that this is a list of sample exam questions only. It is only made available for training purposes and does not contain questions from the actual exam.
The goal is to self-test and get an idea of the character of questions that can be expected in the actual exam.

In the actual exam it is not permitted to use any material, books, or calculators.

Part A: Multiple Choice Questions

Instructions: Each question has only one correct answer. Select the **single, best choice** for each question.

Question 1. Which base is usually used to display a binary file to a user?
   a) Base 2
   b) Base 8
   c) Base 10
   d) Base 16
   e) None of the above

Question 2. Adding the two signed magnitude binary numbers 01000101 and 00011101 equals?
   a) 10001101
   b) 11101010
   c) 11010101
   d) 01100010
   e) None of the above

Question 3. What are the decimal values for the two signed magnitude numbers 01001101 and 10011101?
   a) 77 and 28
   b) 72 and -22
   c) 77 and -29
   d) -80 and -16
   e) None of the above

Question 4. Subtracting 01110011 from 00001011 using 2's complement notation equals?
   a) 10011000
   b) 11010101
   c) 00101100
   d) 11010100
   e) None of the above

Question 5. How many different numbers can be represented with n bits?
   a) n
   b) 2^n
   c) $\log_2(n)$
   d) 16
   e) 32

Question 6. Which of the following basic circuits is used in an ALU?
   a) An S/R adder
   b) A multiplexer
   c) A D-Flipflop
   d) A 2's complement
   e) A decoder

Question 7. Assume a computer architecture where instructions are 64 bits long, which contain a 56 bit memory address, and enough bits to address 8 registers. How many different opcodes can this computer architecture support?
   a) 3
   b) 7
   c) 5
   d) 16
   e) 32

Question 8. Which sequence of instructions in MARIE assembly code results in the value stored at address 123 to be doubled?
   a) Load 0, Add 123, Store 123
   b) Clear, AddI 123, StoreI 123
   c) Load 0, AddI 123, Store 123
   d) Load 123, Add 123, Store 123
   e) Load 0, Subt 123, StoreI 123

Question 10. What is a context switch?
   a) The operating system switching from one process to another
   b) An I/O device that requests that the CPU deals with new input
   c) A signal raised by the currently running process that causes the operating system to perform I/O.
   d) A timer event that causes the operating system to perform process scheduling.

Question 11. Which of the following is **not** a typical function of operating systems?
   a) Managing the CPU's fetch-decode-execute cycle
   b) Handling hardware interrupts
   c) Managing virtual memory
   d) Providing a graphical user interface
   e) Providing access to I/O devices

Question 12. Which of the following is a difference between preemptive timesharing and cooperative timesharing?
   a) Preemptive t. is used in practice, cooperative t. is not.
   b) Preemptive t. can interrupt malicious or buggy processes, cooperative t. cannot.
   c) Preemptive t. does not require hardware support, cooperative t. does.
   d) Preemptive t. does not require cooperation from the user, cooperative t. does.
   e) Preemptive t. makes processes run more efficiently compared to cooperative t.

Question 13. HTTPS means that
   a) A VPN is used for communication
   b) A communication between client and server is encrypted using ASE 128
   c) It is hypertext transfer protocol via TLS.
   d) The authenticity of the server is always guaranteed.

Question 14. Which of the following problems is addressed by the CA part of CSMA/CA?
   a) The "hidden node" problem in wireless LANs.
   b) The "spam" problem in email networks.
   c) The "Certification Authority" problem in public key cryptography.
   d) The "Collision Avoidance" problem in wired Ethernet.

Question 15. How does TCP identify the application layer process that should handle a message?
a) Using the IP address.
b) Using the MAC address.
c) Using the port number.
d) Using the process ID.
e) Using the application ID.

Question 16. Which of the following is **not** part of the TCP protocol?
a) The four-way handshake.
b) The three-way handshake.
c) Acknowledgement numbers.
d) Sequence numbers.
e) HTTP status codes.

Question 17. A "client-server" architecture approach
a) places all or almost all of the application logic on the client
b) places all or almost all of the application logic on the server
c) places all or almost all of the data storage logic on the client
d) places all or almost all of the presentation logic on the server
e) places all or almost all of the network logic on the client

Question 18. Which of the following parameters deteriorates with distance between sender and receiver?
a) Bandwidth
b) Burst rate
c) Frame rate
d) Committed Information Rate
e) Latency

Question 19. Which of the following is a malicious program hidden in what seems a legitimate program?
a) Virus
b) Worm
c) Trojan Horse
d) Backdoor
e) Botnet

Question 20. *Digital signatures* ensure that a message has not been
a) intercepted
b) delayed
c) forwarded
d) forged
e) read

Question 21. One main role of a packet-filter firewall is to drop packets that do not match the criteria defined in policy rules. What are typical parameters?
a) Content on application layer
b) MAC addresses
c) source and destination IP addresses and ports
d) route of the packet
e) digital signatures

Question 22. Which does IDS stand for in network security?
  a) Information Decryption System
  b) Intelligent Data Security
  c) International Defense Society
  d) Internet Decoding Specification
  e) Intrusion Detection System

Question 23. Which property is required for storing passwords?
  a) Confidentiality
  b) Authenticity
  c) Non-repudiation
  d) Privacy
  e) Integrity

Question 24. Which of the following mechanism can be instantiated as software on individual PCs or in hardware as a special device in the network?
  a) Firewalls
  b) Virus scanners
  c) Intrusion detection
  d) Backup
  e) All of the above

Part B: Short Answer Questions

Question 1.
Draw a sketch of the von Neumann Architecture and name the different components.

Question 2.
    a) How many bits are needed to express 1024 numbers?

    b) How many bits are in 32 Gib? (Give answer in power of 2)

Question 3.
Explain the subtraction of two positive integers using 2's complement arithmetic.

Question 4.

A 16-bit word in memory contains two 7-bit ASCII characters and one additional even parity bit for each character. The parity bit is the right-most bit.
a) If you find 01101000 10001110. Would this be a valid representation of two characters?
b) Which two characters are encoded in 10001101 01101010?

ASCII Hexadecimal	ASCII Binary (7-bit)	Character Value
030	0110000	0
031	0110001	1
032	0110010	2
033	0110011	3
034	0110100	4
035	0110101	5
036	0110110	6
037	0110111	7
038	0111000	8
039	0111001	9
041	1000001	A
042	1000010	B
043	1000011	C
044	1000100	D
045	1000101	E
046	1000110	F
047	1000111	G
048	1001000	H

Question 5.
Give one reason why signed integer arithmetic is less suitable for computation of 3D graphics.

Question 6.
Convert the following numbers as specified. Show all workings.

1. From base 10 to base 16: 1286

2. From base 10 to base 2: 2050

3. **From base 16 to base 2: AF81C**

Question 7.
Convert the decimal integer **-65** to an 8-bit binary representation in 2´s complement notation. Show all workings.

Question 8.
Using a truth table show that $X(\neg YY) = 0$ for all values of x and y.

Question 9.
Draw an optimized combinational circuit for the following Boolean function using only NOT, OR, and AND gates. Draw a K-map for the optimization:
$F(X1, X2, X3) = X_1 \neg X_2 \neg X_3 + X_1 X_2 \neg X_3 + \neg X_1 X_2 \neg X_3$

Question 10.
Identify the function of the circuit below. Give an example of inputs A and B (by writing into the squares) and fill in all intermediate and final outputs (dotted squares and circles).
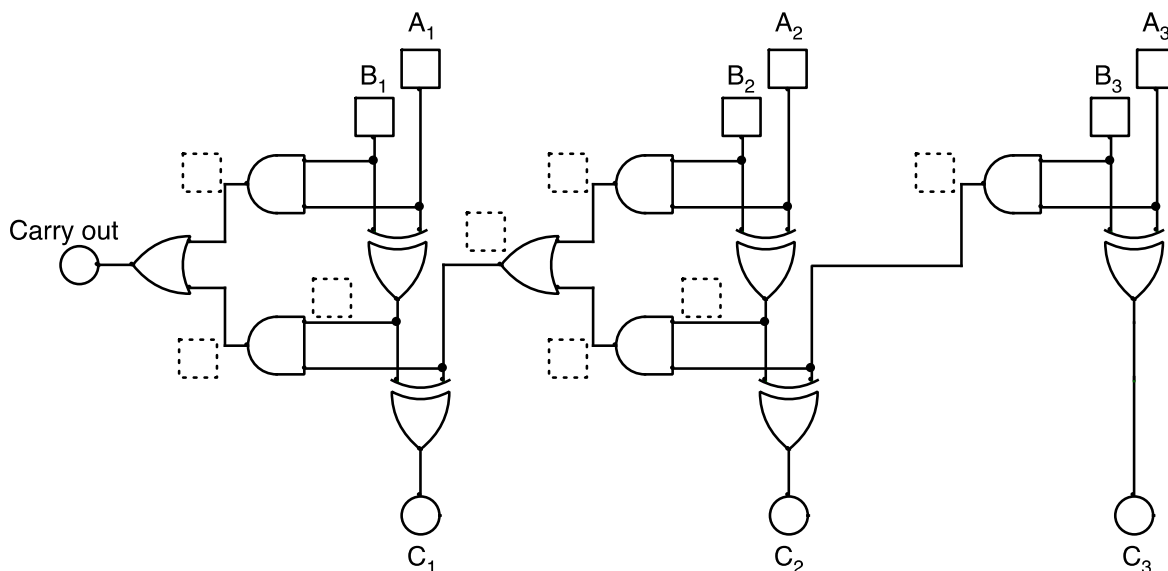
Question 11.
Identify the three main components of a Central Processing Unit and explain their roles.

Question 12.
Describe the difference between a *direct jump* and an *indirect jump* instruction, using the MARIE system as an example.

Question 13.
Identify which MARIE instruction corresponds to the following RTL code:

MAR <- X
MBR <- PC+1
M[MAR] <- MBR
AC <- X+1
PC <- AC

Question 14.
Briefly explain the concept of a *flipflop* circuit. Name a computer component where a flipflop is used.

Question 15.
Briefly explain the difference between *sequential* and *combinational* circuits.

Question 16.
Assume a memory that can store 2^{16} bytes. What are the lowest and highest addresses, and how many bits are needed to store those addresses, if the memory is
1. Byte addressable

2. Word addressable with a word size of 16 bits

Question 17.
Briefly explain the difference between Reverse Polish Notation and "ordinary" arithmetic notation, using the expression $(4 \times 12 + 3) - 10 \div 2$ as an example.

Question 18.
Explain two restrictions for a PC during firmware (BIOS/UEFI) configurations, when compared to a PC running a full operating system.

Question 19.
Briefly explain the concept of a *process*, including the states it can be in.

Question 20.
Briefly explain how the hardware and operating system work together to control how programs access I/O devices.

Question 21.
Name and briefly explain the mechanism that operating systems use to provide each process with its own address space.

Question 22.
Name the layers of the TCP/IP architecture (also called the *Internet Model)*, and briefly explain the function of layer 2.

Question 23.
Briefly explain how a switch works.

Question 24.
Briefly explain how a router works.

Question 25.
Briefly describe the two-tier email architecture (using a diagram).

Question 26.
Name two different methods for transmitting digital data through cables.

Question 27.
Explain the advantage of *roaming* in wireless networks.

Question 28.
Name the acronym of the application layer protocol used for accessing the World Wide Web.

Question 29.
Are wireless LANs more or less secure than wired Ethernet? Explain your answer.

Question 30.
Explain the high-level structure of the Internet.

Question 31.
What is the difference between *interior* and *exterior routing protocols?*

Question 32.
What are the end-points of the encrypted channel in a VPN connection? Explain why a VPN does not provide end-to-end security between a home-office PC and a PC in the enterprise network.

Question 33.
Certificates are used to identify servers when using TLS. Give one reason, why certificates can be problematic.

Question 34.
Explain the term demilitarised *zone* and provide 2 examples of firewall placements for such a zone..

Question 35.
Compare public Message Authentication Codes and Hash Functions showing one similarity and one difference.

Question 36.
What is a currently recommended hash function for use in digital signatures and which hash function is still used, but no longer recommended.