UNIVERSITY OF NEW YORK TIRANA
Komuna e Parisit,Tirana, Albania
Tel.: 00355-(0)4-273056-8 – Fax: 00355-(0)4-273059
***Web Site Address*: http://www.unyt.edu.al**

Introduction to Computer Science

Spring 2016

Orientating questions for the midterm exam

Lesson 1

1. Describe what you understand with "Algorithm".
2. Give an example of a simple algorithm.
3. Describe the difference between a program and programming.
4. What was the Difference Engine able to compute?
5. Which were the main generations of computers in the 20^{th} century?
6. What was the evolution from wires towards integrated circuits?
7. Describe the relationship between the birth of MS-DOS and the personal computers.

Lesson 2

1. Explain the Boolean operators.
2. What is a gate? Describe the basic gates.
3. What is a flip-flop? Sketch a flip-flop and describe how it works.
4. Describe how memory cells are organized by address.
5. What is the difference between sequential memory access and RAM?
6. One Giga is 10^{y}. What is the value of y?
7. Sketch the memory hierarchy? What is relationship in cost and speed in the vertical dimension?
8. Sketch a hard disk explaining what are: spindle, track, cylinder, sector, platter, head.
9. What is formatting of a disk?
10. What is the essential property of optical storage systems?
11. Briefly describe the flash memory technology.
12. Explain the difference between logical and physical records.
13. What are ASCII and Unicode?
14. What is the difference between a .txt file and a proprietary format such as Word.
15. Describe with an example the bitmap technique.
16. Describe with an example the RGB technique.
17. Convert into the decimal system the binary number 1110011.
18. Convert into the binary system the numbers: 346 and 487.

19. Convert into the decimal system the binary number 1010.011.
20. What is the fixed-point representation?

Lesson 3

1. Perform the following additions: 11101 + 100011; 100111 + 101101.
2. Find the two's complement of the following numbers: 1100101 and 101011.
3. Perform the following subtractions: 11101101 – 100010; 10011111 – 101111.
4. Perform the following multiplication: 111011 x 110011.
5. Describe the excess eight notation.
6. Describe the floating point notation.
7. Suppose you are using the floating point notation with 8 bit, 1 bit for the sign, 3 bits for the exponent and 4 for the mantissa. You are using the three-bit excess notation for the exponent.
   Compute the decimal value of the number 01011001.
8. What is run-length encoding?
9. What is frequency-dependent encoding?
10. What is differential encoding?
11. What is dictionary encoding?
12. What is LZW encoding?
13. Describe the GIF standard?
14. Describe the three steps of the JPEG compression.
15. How are motion pictures of a video compressed with MPEG?
16. Which techniques are employed in MP3?
17. Describe the use of the parity bit.
18. Describe an error correction code with an example.

Lesson 4

1. Sketch the computer hierarchy outlining the level of machine language.
2. Describe the general structure of the CPU.
3. What is the stored program concept and the single memory computer architecture?
4. Describe the Von Neumann bottleneck.
5. Describe extensions to the Von Neumann architecture.
6. What are RISC and CISC? What is the difference between these in terms of design?
7. Describe the major instruction types.
8. Describe step by step the execution of the following program, specifying in every step the values of the program counter and instruction register.

Encoded instructions	Translation
156C	Load register 5 with the bit pattern found in the memory cell at address 6C.
166D	Load register 6 with the bit pattern found in the memory cell at address 6D.
5056	Add the contents of register 5 and 6 as though they were two's complement representation and leave the result in register 0.
306E	Store the contents of register 0 in the memory cell at address 6E.
C000	Halt.

9. What is the role of the assembler?
10. What does the following program perform?

```
SUB32   PROC
        CMP   AX,97
        JL    DONE
        CMP   AX,122
        JG    DONE
        SUB   AX,32
DONE:   RET
SUB32   ENDP
```

Translate it in a simple pseudo code in high level language.

Lesson 5

1. Describe the role of controllers in the computer.
2. What are USB and FireWire.
3. Describe Memory-mapped I/O.
4. Describe DMA.
5. What are serial and parallel communications? Give examples of such approaches.
6. Describe the tasks of a modem.
7. What is the main feature of a DSL service?
8. What is the function of a clock in a computer?
9. Describe pipelining.
10. Describe a SISD architecture.
11. Describe a SIMD architecture.
12. Describe a MISD architecture.
13. Describe a MIMD architecture.

Lesson 6

1. Describe batch processing.
2. Describe multiprogramming.
3. Describe time-sharing.
4. Describe bootstrapping.
5. What are interrupts? Describe their functions.
6. Describe the work of the scheduler and the dispatcher in process execution.
7. What is context switch? Discuss the performance issues related with it.