

SCUT Final Exam

Foundations of Computer Science Exam Paper A (2021-2022-1)

- Notice:**
1. Make sure that you have filled the form on the left side of seal line.
 2. Write your answers on **the answer sheet**.
 3. This is a **close-book** exam.
 4. The exam with full score of 100 points lasts 120 minutes.

Question No.	I	II	III	IV	Sum
Score					

1. Fill in the blanks (5 blanks \times 2')

(1) Computer _____ is the collection of programs that provide the instructions that a computer carries out.

(2) A(n) _____ is a natural number, a negative of a natural number, or zero.

(3) A TrueColor RGB representation of one pixel takes up _____ bytes.

(4) A gate that accepts two input values has _____ possible input combinations.

(5) The _____ is a set of wires through which data travels between the main components of a computer.

2. Single selection questions (20×2')

(1) Which of the following terms best describes the concept of abstraction?

A) exposing difficulty B) hiding quantity

C) exposing distance D) hiding details

(2) What is a single binary digit called?

A) byte B) nibble C) bit D) word

(3) How many digits are there in the octal number system?

A) 10 B) 2 C) 7 D) 8

(4) How many things can be represented using four bits?

A) 4 B) 8 C) 12 D) 16

(5) Which technique for representing numeric data has two forms of zero?

A) signed-magnitude B) fixed-sized numbers

C) floating point D) ten's complement

(6) Which text compression technique replaces a frequently used word with a single character?

A) run-length encoding B) character set encoding

C) keyword encoding D) Huffman encoding

(7) A transistor is made up of what kind of material?

A) semiconductor B) conductor C) insulation D) rubber

(8) Which of the following circuits represented by Boolean expressions is/are equivalent?

A) AB , BA B) $A(B+C)$, $(AB) + (AC)$

C) $A+BC$, $(A+B)(A+C)$ D) all of the above

(9) The _____ memory contains a copy of a portion of main memory.

A) CPU B) main C) cache D) ROM

(10) Which of the following manages the fetch-execute cycle?

- A) control unit B) arithmetic/logic unit
- C) auxiliary storage device D) RAM

(11) Which language is actually executed by the central processing unit of a computer?

- A) high-level language B) assembly language
C) machine language D) virtual language

(12) Which of the following represents a set of unambiguous instructions for solving a problem in a finite amount of time using a finite set of data?

- A) algorithm B) pseudocode
- C) program construct D) problem specification

(13) Pseudocode uses a mixture of English and indentation to express the processing steps of an algorithm.

- A) True B) False

(14) The code-coverage testing approach eliminates the need to test some of the code by covering it with a theoretical “black box.”

- A) True B) False

(15) RAM is non-volatile and ROM is volatile.

- A) True B) False

(16) A touch screen is both an input and output device.

- A) True B) False

(17) A megabyte of memory space is larger than a gigabyte of memory

space.

A) True B) False

(18) An AND gate and an OR gate produce opposite output.

A) True B) False

(19) A character set is a list of characters and their numeric codes.

A) True B) False

(20) The letter C is used to represent the number 11 in hexadecimal.

A) True B) False

3. Calculations (5×6')

(1) Convert the binary number 11011011 to the target base .

A. to base 10 B. to base 8 C. to base 16

(2) If 891 is a number in each of the following bases, how many 1s are there?

A. base 12

B. base 8

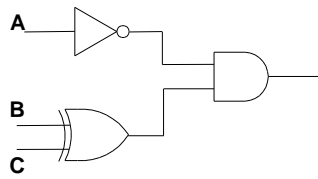
(3) Given a fixed-sized number scheme where k in the formula for the ten's complement is 3 ($\text{Negative}(I) = 10^k - I$), answer the following questions.

A. How many negative integers can be represented?

B. Show the three smallest and largest positive numbers, the three smallest and largest negative numbers?

(4) Show the behavior of the following circuit with a truth table and give

the boolean expression:



(5) What does code *X8BBC*A9 represent using run-length encoding?

What is the compression ratio?

4. Essay questions (4 × 5')

- (1) Why do computers have difficulty with analog information?
- (2) Name the components of a von Neumann machine.
- (3) How can gates be combined into circuits?
- (4) Write a pseudocode algorithm for Binary Search in a sorted array.