

**Program: BSc Computer Science**

**Course code: BCS1110**

**Examiners: dr. Ashish Sai & dr. Thomas Bitterman**

**Date/time: 24-Oct-2023, 17:00 to 19:00**

**Format: Closed book exam**

**Allowed aids: Pens, simple (non-programmable) calculator from the DACS list of allowed calculators**

# **Sample Exam Paper (2)**

**BCS1110**

**2023/24**

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**Multiple Choice Question**

**Instructions:** For the following multiple-choice questions (MCQs), only one answer is correct. Please select the most appropriate option.

3p **1a** Which statement accurately describes Two-Factor Authentication (2FA)?:

- ☐ a 2FA involves using a username and a strong password for authentication
- ☐ b 2FA requires users to authenticate using their fingerprint and retinal scan
- ☒ c 2FA involves using two different forms of verification, such as something you know
- ☐ d 2FA is primarily used for remote data backup and recovery

3p **1b** Which of the following statements accurately describes the main difference between IPv4 and IPv6?

- ☐ a IPv4 and IPv6 have identical address formats, differing only in their implementation *no*
- ☐ b IPv4 is more secure than IPv6 due to its longer address format *no*
- ☐ c IPv6 is the older version, while IPv4 is the newer *no*
- ☒ d IPv4 uses 32-bit addresses, while IPv6 uses 128-bit

3p **1c** In a DFA, the set of states includes

- ☒ a Both accepting and non-accepting states
- ☐ b Only the initial state
- ☐ c Only the accepting state
- ☐ d A single state called the "halt" state

3p **1d** What is the primary function of the **git pull** command?

- ☒ a Fetch and merge changes from a remote repository into the current branch *←*
- ☐ b Push changes to a remote repository
- ☐ c Create a new branch in the local repository
- ☐ d Stage changes for the next commit

# Private Key used for decryption

Sample Exam Paper BCS11110 – 2023

3p 1e In public key cryptography, which key is used for encryption?



Public key



Private key



Shared key



Symmetric key

$1 \iff P$

$P \iff P$

3p. 1f Which logic gate performs the following operation: the output is true (1) if and only if one input is true (1), but not both?



AND gate



OR gate



XOR gate



NOT gate

## Course Theme and Computing Hardware

3p 2a Each text message contains a date (8 bytes), time sent (4 bytes), up to 160 characters of text, and the sender's phone number (8-byte number). How many text messages can you store on a 128GB hard drive?

$$128 \text{ GB} = 128 \cdot 10^9 \text{ bytes}$$

$$\text{message size} = 8 + 4 + 160(1) + 8$$

$$= 180$$

$$\text{number of mes.} = \frac{128 \cdot 10^9}{180} =$$

6p **2b** In computer science, **abstraction** is a fundamental concept that simplifies complex systems by hiding unnecessary details. How does abstraction benefit software development?

• API

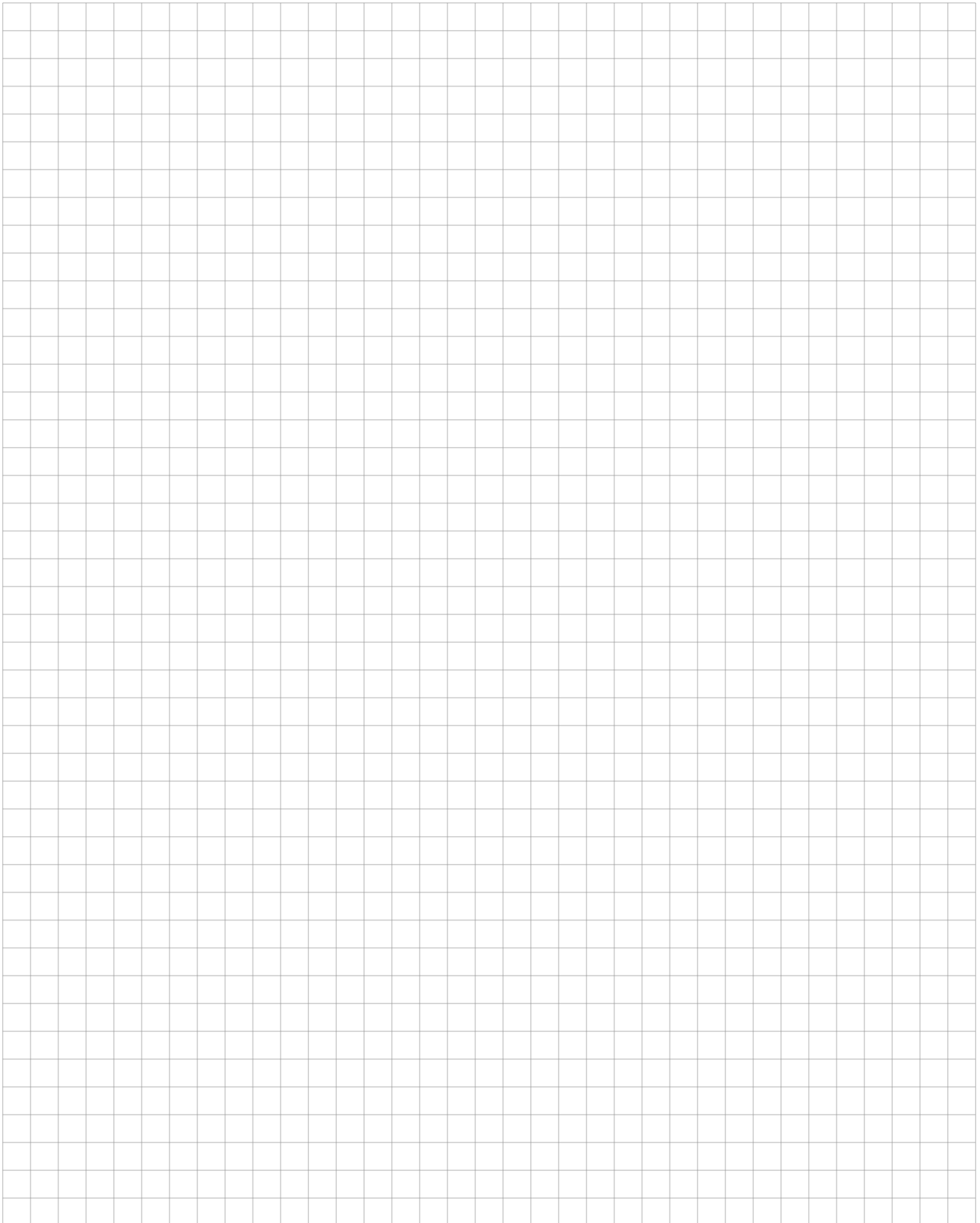
Approach to simplify complex systems by focusing on a higher-level overview, rather than focus on unnecessary details

→ High level programming languages

→ API

2p **2c** Develop a truth table for the logical statement  $(X \text{ AND } Y) \text{ OR } (\text{NOT } Z)$ , and construct a circuit diagram that mirrors this logical expression (**2d**).





## Algorithm and version control

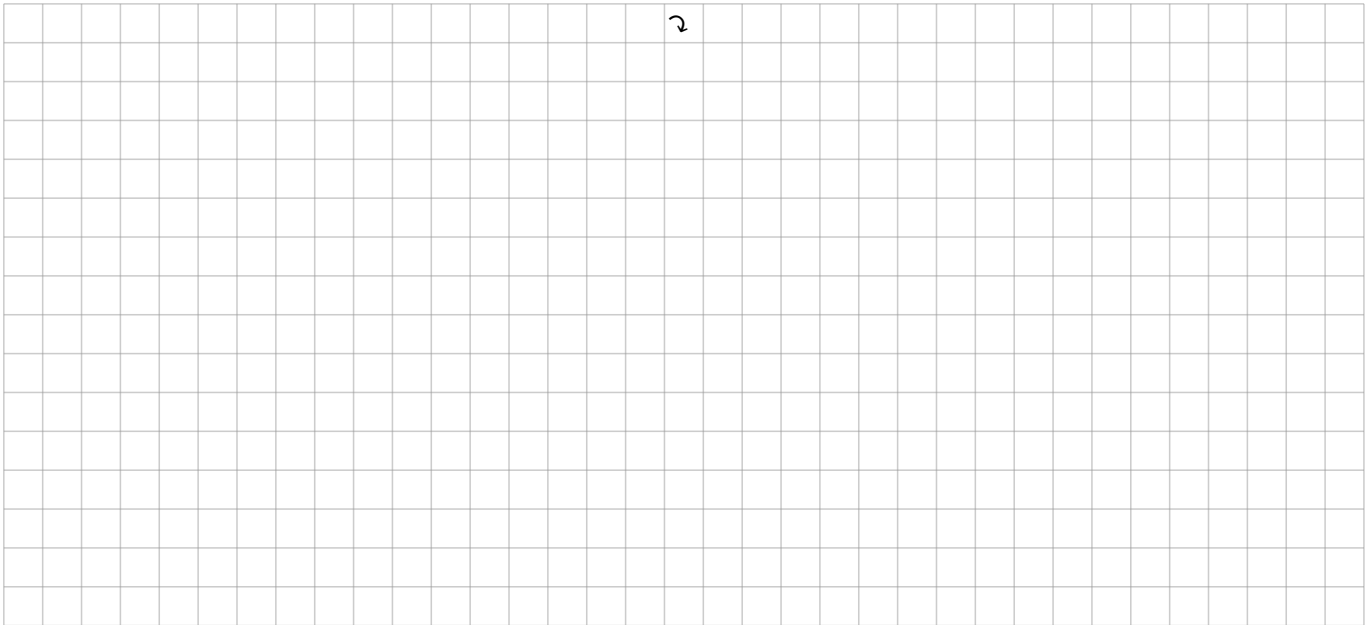
4p **3a** With GUIs everywhere, why is the command line still in use?


6p **3b:** Design a flowchart and write pseudocode for the process of preparing breakfast, taking into account different procedures for a weekday and a weekend. Include activities like brewing coffee, toasting bread, and frying eggs. Ensure that the flowchart and pseudocode outline distinct steps based on whether it's a weekday or weekend.

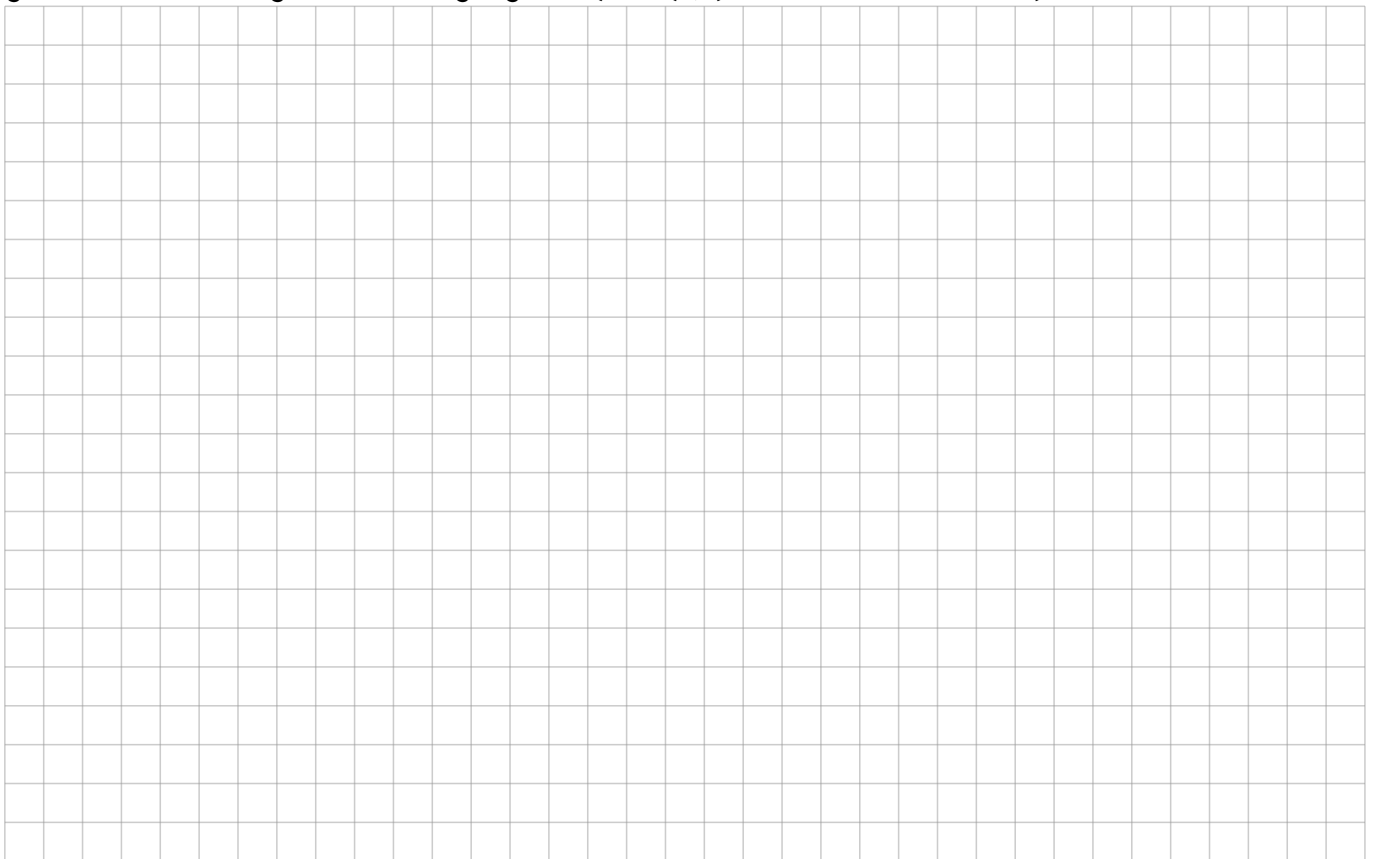
## Theory of Computation

4p **4a** Can you explain the key differences between Deterministic Finite Automata (DFAs) and NFAs, and in what scenarios NFAs are more advantageous?


8p **4b** Draw a DFA for the language accepting strings ending with '011' over input alphabets  $\Sigma = \{0, 1\}$



6p **4c** Design an NFA that recognizes the language  $L = \{ w \in \{0,1\} \mid w \text{ ends in } 010 \text{ or } 101 \}$ .





**Computer Networks**

4p      **5a**      Describe how DNS spoofing works and why it is a concern for Internet users.


6p      **5b**      Describe the role of routers in connecting a Local Area Network (LAN) to an Internet Service Provider (ISP).



4p **5c** Define the following terms: LAN, WAN, MAN, Ethernet, JSON, API


**Information Security**

- 4p **6a** What does it mean that a messaging service is “end-to-end encrypted”? What is an example of a messaging service with “end-to-end encryption”? What is an example of a messaging service that does not “end-to-end encrypt” your messages?


- 4p **6b** Role of HTTPS: Explain the difference between HTTP and HTTPS in web browsing.


- 4p **6c** Discuss the significance of strong password policies, including password complexity requirements and periodic changes. Explain why weak passwords are a security risk.


## Project (JavaCraft)

As a part of this course, you worked on a group project titled **JavaCraft**. In the following questions (7a, 7b and 7c), you should provide answers based on your work on the project.

2p **7a** What improvements or additional features could be added to enhance the game's functionality and user experience?


2p **7b** What is the use of the `clearScreen()` function, and why is it needed in the game?

2p **7c** Explain the role of the `getCountryAndQuoteFromServer()` function and its connection to the game's narrative.

