



ANDERSON SERANGOON JUNIOR COLLEGE
JC1 Promotional Examination 2025
Higher 2

COMPUTING

9569/01

Paper 1 Written

8 Oct 2025 (Wednesday)

1 hour 15 minutes

READ THESE INSTRUCTIONS FIRST

5 sheets of writing papers will be provided with the question paper. If you need additional writing papers, ask the invigilator for more writing papers.

Answer all questions.

Approved calculators are allowed.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 45.

This document consists of 4 printed pages.

Anderson Serangoon Junior College

[Turn over

- 1 The following recursive function returns a to the power of b for given non-negative integers.

01	FUNCTION power(a : INTEGER, b : INTEGER) RETURNS INTEGER
02	IF b = 0 THEN
03	RETURN 1
04	ENDIF
05	RETURN a * power(a, b - 1)
06	ENDFUNCTION

- (a) (i) State what is meant by **recursion**. [1]
- (ii) State the line number(s) that indicate the function is recursive. [1]
- (iii) State the significance of line 02. [1]
- (b) Draw a trace tree diagram for the recursive function call power(3, 5). [3]
- (c) Explain the use of a stack when power() executes. [4]
- (d) Describe an error or problem that might occur when this recursive function is called with a negative integer for b . [1]
- (e) Suggest one validation technique to mitigate the error or problem experienced in part (d). [1]

- 2 The following strings are stored in an array. This array uses 0-indexing.

"server"	"router"	"cpu"	"keyboard"	"monitor"	"gpu"
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- (a) Describe the process by which a linear search locates the position of the element 'keyboard' in the array. [2]
- (b) State why a binary search cannot be used directly in this example. [1]
- (c) Write the states of the above array after **each** iteration of **insertion sort** as it arranges the array in ascending alphabetical order. [3]

A network administrator needs to sort a list of 10,000 computer hardware components by name for a large inventory management system. The system processes multiple sorting requests throughout the day, and performance is critical for user experience.

- (d) State the worst-case time complexity of the insertion sort algorithm. [1]
- (e) Given the context above, suggest a more appropriate sorting algorithm, clearly justifying your choice. [2]

- 3 A user on *Client A* writes an email with a 10 MB attachment and sends it to *Client B*. Each client connects to its mail server (client-server model). The two mail servers communicate over a multi-hop packet-switched network. Routers along the path use store-and-forward forwarding.

- (a) Describe the roles of the client and the server in this email scenario. [2]
- (b) Explain the difference between packet switching and circuit switching. [2]
- (c) Explain a disadvantage of packet switching in this context of sending the email attachment. [2]

- 4 A company that specialises in home security solutions is designing a control system for each device using Object Oriented Programming (OOP).

All devices have these features:

- device ID
- location
- turn on
- turn off
- activation on
- activation off
- start alarm
- stop alarm

There are three different devices: camera, door sensor and smart camera.

The camera has these additional features:

- start recording
- stop recording
- display recordings
- display livestream

The smart camera includes all the camera features and these additional features:

- activate sensor
- deactivate sensor

The door sensor has these additional features:

- set open
- set close
- display current status

- (a) Draw an inheritance diagram for this system showing the base class and any derived classes, including properties and methods.

[7]

- (b) Explain how inheritance and polymorphism are applied in the home security solutions context, giving one explicit example of inheritance and one example of polymorphism from the classes above.

[4]

- 5 ASCII allows for characters to be stored in memory by associating a number with each character. In memory, that number is stored as a pattern of bits.

The denary value for the character 'M' in ASCII is 77.

- (a) Represent this value in 8-bit binary, showing your workings. [2]

The Unicode code point for the emoji 🤖 is U+1F631 in hexadecimal.

- (b) Convert the Unicode code point to its denary value. [1]
 (c) State the values that are common to both ASCII and Unicode. [1]
 (d) Explain how Unicode improves compatibility across platforms. [3]

END OF PAPER