VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

**Victorian Certificate of Education
2023**

Letter

STUDENT NUMBER

ALGORITHMICS (HESS)
Written examination

Wednesday 15 November 2023

**Reading time: 3.00 pm to 3.15 pm (15 minutes)
Writing time: 3.15 pm to 5.15 pm (2 hours)**

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	10	10	80
			Total 100

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

Materials supplied
- Question and answer book of 29 pages
- Answer sheet for multiple-choice questions

Instructions
- Write your **student number** in the space provided above on this page.
- Check that your **name** and **student number** as printed on your answer sheet for multiple-choice questions are correct, **and** sign your name in the space provided to verify this.
- All written responses must be in English.

At the end of the examination
- Place the answer sheet for multiple-choice questions inside the front cover of this book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – Multiple-choice questions

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1; an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Use the Master Theorem to solve recurrence relations of the form shown below.

$$T(n) = \begin{cases} aT\left(\dfrac{n}{b}\right) + kn^c & \text{if } n > 1 \\ d & \text{if } n = 1 \end{cases} \quad \text{where } a > 0,\, b > 1,\, c \geq 0,\, d \geq 0,\, k > 0$$

$$\text{and its solution } T(n) = \begin{cases} O(n^c) & \text{if } a < b^c \\ O(n^c \log n) & \text{if } a = b^c \\ O(n^{\log_b a}) & \text{if } a > b^c \end{cases}$$

SECTION B

Instructions for Section B

Answer **all** questions in the spaces provided.

Use the Master Theorem to solve recurrence relations of the form shown below.

$$T(n) = \begin{cases} aT\left(\dfrac{n}{b}\right) + kn^c & \text{if } n > 1 \\ d & \text{if } n = 1 \end{cases} \quad \text{where } a > 0,\, b > 1,\, c \geq 0,\, d \geq 0,\, k > 0$$

$$\text{and its solution } T(n) = \begin{cases} O(n^c) & \text{if } a < b^c \\ O(n^c \log n) & \text{if } a = b^c \\ O(n^{\log_b a}) & \text{if } a > b^c \end{cases}$$
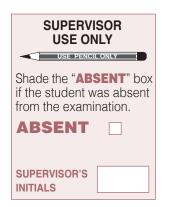
09999 : VICTORIAN SECONDARY COLLEGE

VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

VICTORIA State Government

VCE ALGORITHMICS (HESS)
Written Examination
ANSWER SHEET – 2023

STUDENT NAME: JOHN STUDENT

STUDENT NUMBER

9 9 1 2 3 4 5 6 A

0	0	0	0	0	0	0	0	■
1	1	■	1	1	1	1	1	E
2	2	2	■	2	2	2	2	F
3	3	3	3	■	3	3	3	G
4	4	4	4	4	■	4	4	J
5	5	5	5	5	5	■	5	L
6	6	6	6	6	6	6	■	R
7	7	7	7	7	7	7	7	T
8	8	8	8	8	8	8	8	W
■	■	9	9	9	9	9	9	X

INSTRUCTIONS:

USE PENCIL ONLY

SIGN HERE IF YOUR NAME AND NUMBER ARE PRINTED CORRECTLY.

SIGNATURE: J. Student

If your name or number on this sheet is incorrect, notify the Supervisor.

Use a **PENCIL** for **ALL** entries. For each question, shade the box which indicates your answer.

All answers must be completed like **THIS** example:

Marks will **NOT** be deducted for incorrect answers.

| A | ■ | C | D |

NO MARK will be given if more than **ONE** answer is completed for any question.

If you make a mistake, **ERASE** the incorrect answer – **DO NOT** cross it out.

ONE ANSWER PER LINE

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D

ONE ANSWER PER LINE

11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D