

**NATIONAL UNIVERSITY OF SINGAPORE**  
**CS1231S – DISCRETE STRUCTURES**  
 (Semester 1: AY2023/24)

**Final Assessment Answer Sheets**

Time Allowed: 2 Hours

**INSTRUCTIONS**

1. Write your **Student Number** on the right AND, using a pencil, shade the corresponding circle **completely** in the grid for each digit or letter. **DO NOT WRITE YOUR NAME!**
2. Zero mark will be given if you write/shade your Student Number incompletely or incorrectly.
3. Write your Student Number at the top of page 3.
4. These answer sheets comprise **FOUR (4) pages**.
5. All questions must be answered in the space provided; no extra sheets will be accepted as answers.
6. You must submit only these **ANSWER SHEETS** and no other documents.
7. You may write your answers using pencil (at least 2B) or pen as long as it is legible (no red ink, please).
8. The maximum mark for this paper is 100.
9. **Marks may be deducted** for (i) illegible handwriting, and/or (ii) excessively long explanations.
10. Each multiple choice question is intended to have only one answer. Shade the appropriate bubbles using pencil only.

STUDENT NUMBER										
	<b>A</b>									
<b>U</b>	<input type="radio"/>	0	0	0	0	0	0	0	A	N
<b>A</b>	<input checked="" type="radio"/>	1	1	1	1	1	1	1	B	R
<b>HT</b>	<input type="radio"/>	2	2	2	2	2	2	2	E	U
<b>NT</b>	<input type="radio"/>	3	3	3	3	3	3	3	H	W
		4	4	4	4	4	4	4	J	X
		5	5	5	5	5	5	5	L	Y
		6	6	6	6	6	6	6	M	
		7	7	7	7	7	7	7		
		8	8	8	8	8	8	8		
		9	9	9	9	9	9	9		

For Examiner's Use Only		
Question	Marks	Remarks
Q1-22	/ 44	
Q23	/ 6	
Q24	/ 20	
Q25	/ 20	
Q26	/ 10	
<b>Total</b>	<b>/ 100</b>	

**Part A: Multiple Choice Questions** (Total: 44 marks)Please shade only ONE bubble for each question. Please use ONLY pencil to shade.

- |    | (A)                   | (B)                   | (C)                   | (D)                   | (E)                   |
|----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 1. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
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|----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 5. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
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|-----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 9.  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
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|-----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 13. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 14. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 15. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 16. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
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|-----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 17. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 18. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 19. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 20. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
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|-----|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 21. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 22. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

	(A)	(B)	(C)	(D)	(E)
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**Part B** (Total: 56 marks)

23. **Cycle notation.** [6 marks]

(a) [2]  (b) [2]  (c) [2]

24. **Graphs and trees.** [20 marks]

(a) [2]  (b) [3]  (c) (i) [1]  (ii) [1]  (iii) [1]

(d) [4]  (e) [2]

(f) (i) [1]  (ii) [1]  (iii) [1]

(g) (i) [1]  (ii) [1]  (iii) [1]

25. **Counting and probability.** [20 marks]

(a) [1]  (b) [2]  (c) [2]  (d) [3]

(e) [3]  (f) [4]

(g) (i) [2]  (ii) [3]

26. **Mathematical induction.** [10 marks]

(a)  
[2]

(b)  
[6]

(c)  
[2]

=== END OF PAPER ===