

## NATIONAL UNIVERSITY OF SINGAPORE

## CS1231S – DISCRETE STRUCTURES

(Semester 1: AY2025/26)

## Final Assessment Answer Sheets

Time Allowed: 2 Hours

## INSTRUCTIONS

1. Write your **Student Number** on the right AND, using a **pencil** (2B or above), 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. There are **FOUR (4) pages** in the Answer Sheets.
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. An excerpt of the question may be provided to aid you in answering in the correct box. It is not the exact question. You should still refer to the original question in the question paper.
8. You may write your answers in pencil (2B or above) or pen. Pencil is preferred in case you need to erase and rewrite your answers.
9. The maximum mark for this paper is 100.
10. **Marks may be deducted** for (i) illegible handwriting, and/or (ii) excessively long answer.
11. Each multiple choice question is intended to have only one answer. Please shade the appropriate bubble in **pencil**.

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

For Examiner's Use Only		
Question	Marks	Remarks
Q1-23	/ 46	
Q24	/ 20	
Q25	/ 20	
Q26	/ 14	
<b>Total</b>	<b>/ 100</b>	



Any feeling about this exam paper?

This will not be graded! 😊

**Part A: Multiple Choice Questions** (Total: 46 marks)Please shade only ONE bubble for each question using **pencil (2B or above)**.

	(A)	(B)	(C)	(D)	(E)	
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1.
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6.
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7.
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8.
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9.
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10.
11.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11.
12.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12.
13.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13.
14.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14.
15.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15.
16.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16.
17.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17.
18.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18.
19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19.
20.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20.
21.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21.
22.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	22.
23.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	23.
	(A)	(B)	(C)	(D)	(E)	

Student Number: A

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**Part B** (Total: 54 marks)**24.** (a) 12 balls [2]  
[20]

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(b) Committees [2]

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(c) Passwords [2]

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(d) Circular table [2]

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(e) Circular table [2]

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(f) Socks [2]

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(g) 3 dice [3]

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(h) (i)  $P(S|O)$  [2]

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(ii)  $P(S|U)$  [2]

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(iii) Spam signal [1]

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**25.** (a) Is  $K_{3,4}$  planar? [2]  
[20]

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(b)  $K_{m,n}$  to be Eulerian [2]

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(c)  $K_{m,n}$  to be Hamiltonian [2]

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(d) Which cycle graphs are bipartite graphs [2]

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(e) Perfect matching condition [2]

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(f) Draw bipartite graph and write out the maximal matching and maximum matching [4]

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(g) Is there a perfect matching for  $G_1$ ? [3]

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(h) Is there a perfect matching for  $G_2$ ? [3]

--

**26.**

[14]

(a)

(i)  $f$  [2](ii)  $g$  [2](iii)  $h$  [2](iv)  $k$  [2]

(b)

(i)  $z^{-1}([3])$  [2](ii)  $z^{(2)}(x)$  [2](iii) Order of  $[3]$  [2]

=== END OF PAPER ===