NATIONAL UNIVERSITY OF SINGAPORE

CS1231S – DISCRETE STRUCTURES

(Semester 2: AY2021/22)

ANSWER SHEETS

Time Allowed: 2 Hours

INSTRUCTIONS

1. These ANSWER SHEETS consist of **SIX (6)** printed pages.
2. Answer **ALL** questions on these Answer Sheets. You are to submit only these Answer Sheets and not the question paper. You may write in pen or pencil.
3. Printed/written materials are allowed. Apart from calculators, electronic devices are not allowed.
4. The maximum mark of this assessment is 100.
5. Do not write your name. Write your Student Number (eg: A0123456X) below.

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=== END OF INSTRUCTIONS ===

For internal use only

MCQs (20)	MRQs (18)	Q17 (5)	Q18 (10)	Q19 (20)	Q20 (20)	Q21 (7)	Total (100 marks)

Write your answers for MCQs and MRQs in the boxes below, in **CAPITAL LETTERS**:

PART A:

1	**2**	**3**	**4**	**5**
6	**7**	**8**	**9**	**10**

PART B:

11	**12**	**13**	**14**	**15**	**16**

PART C:

Q17. Prove by mathematical induction: $\mathbf{7} \mid (\mathbf{5}^{\boldsymbol{2n+1}} + \mathbf{2}^{\boldsymbol{2n+1}})$ for all $n \in \mathbb{N}$. [5 marks]

Q18. **[Total: 10 marks]**

(a) [6]

	Is injective? (Write "true" or "false")	Is surjective? (Write "true" or "false")
(i)		
(ii)		
(iii)		

(b) [2]

(c) [2]

Q18 Total: **/10**

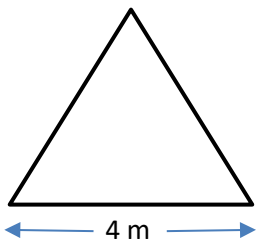
Q19. **[Total: 20 marks]**

(a) (i) [1] (ii) [1] (iii) [2]

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

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

(d) (i) [2] (ii) Write your explanation below. [3]



Q19 Total: **/20**

Q20. **[Total: 20 marks]**

(a) [3] Non-isomorphic, connected simple graphs on four vertices.

(b) (i) [2]. (…graph $K_{2,4}$)

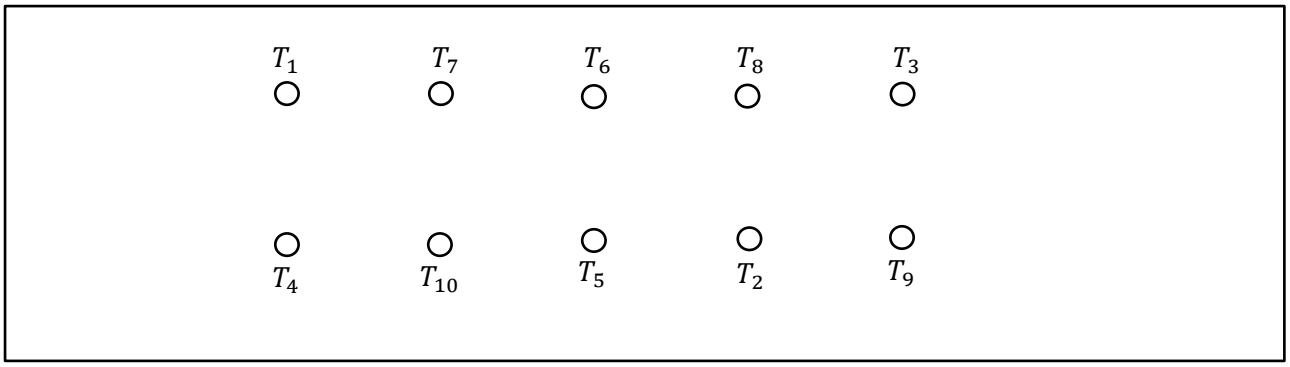
(b) (ii) [2]. (…graph $K_{3,4}$)

(b) (iii) [2]. (…5 vertices, 8 faces)

(b) (iv) [2] (…graph $K_5 - \{e\}$)

(c) [Subtotal: 9]

(i) [3] (Fill in the edges in the graph G)



(ii) [2]. (Colour the graph G above that you have obtained in part (i). If you do not have colour pens/pencils, you can label the vertices with colour labels C1, C2, C3, C4, etc.)

(iii) [2]

(iv) [2] (use a minimum number of machines)

Machine	Tasks Assigned
M1:	_____
M2:	_____
____:	_____
____:	_____
____:	_____
____:	_____

Q20 Total: /20

Q21. **[Total: 7 marks]**

=== END OF ANSWER SHEETS ===

Q21 Total: /7