



## FINAL SEMESTER EXAMINATION

Student NRIC : \_\_\_\_\_  
Student ID : \_\_\_\_\_

Programme	:	<b>DIPLOMA IN COMPUTER SCIENCE (MQA/PA13808)</b>
Intake	:	<b>MAY / JUNE 2021 (YEAR 1 SEMESTER 2)</b>
Course	:	<b>DISCRETE MATHEMATICS</b>
Course Code	:	<b>DCS1123</b>
Duration	:	<b>3 hours</b>

### INSTRUCTIONS TO CANDIDATES:

1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper consists of **FOUR (4)** questions
3. Answer **ALL** questions in the question paper.
4. Answers to the questions are to be written into the examination booklet.
5. Electronic dictionaries, lecture notes, files or any unauthorised materials except writing equipment are strictly prohibited.

This question paper must be submitted along with all used and/or unused rough papers and/ or graph papers (if any). Candidates are **NOT ALLOWED** to take any examination paper(s) used or unused out of the examination hall.

### WARNING:

The Examination Board of Peninsula College Georgetown regards cheating as a very serious offence and will not hesitate to mete out the appropriate punitive actions according to the severity of the offence committed, and in the accordance with the clauses stipulated in the Students' Handbook, up to and including expulsion from Peninsula College Georgetown.

*(This booklet contains 5 printed pages including this page)*

**DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ALLOWED TO DO SO**

For examiner's use only

QUESTION NO.	MARKS
1	/ 25
2	/ 25
3	/ 25
4	/ 25
<b>Total</b>	<b>/ 100</b>

Answer **ALL** questions on the separate sheet provided.

**[100 marks]**

1. a) A die and coin are tossed together.
  - i) Draw a tree diagram. (6 marks)
  - ii) Find the sample space. (6 marks)
  - iii) Determine the probability that a head and a number less than 3 occurs. (1 marks)
  
- b) The probability that a smartphone manufactured by Jaya Factory has a display problem is  $\frac{2}{13}$ . Two smartphones are chosen at random.
  - i) Draw a tree diagram. (4 marks)
  - ii) Find all the possible outcomes. (4 marks)
  - iii) Calculate the probability that at least one smartphone chosen has a display problem. (4 marks)

Total: [25 marks]
  
2. a) There are 10 different flavour candies in a plastic bag. Find
  - i) The number of ways 3 candies can be chosen from the plastic bag. (2 marks)
  - ii) The number of ways at least 8 candies can be chosen from the plastic bag. (3 marks)
  
- b) In how many ways can 5 boys and 4 girls be arranged on a bench if:
  - i) boys and girls alternate? (3 marks)
  - ii) boys and girls are in separate groups? (3 marks)
  
- c) How many arrangements of the letters of the word REMAND are possible if:
  - i) there are no restrictions? (2 marks)
  - ii) they begin with RE? (2 marks)
  - iii) they do not begin with RE? (3 marks)

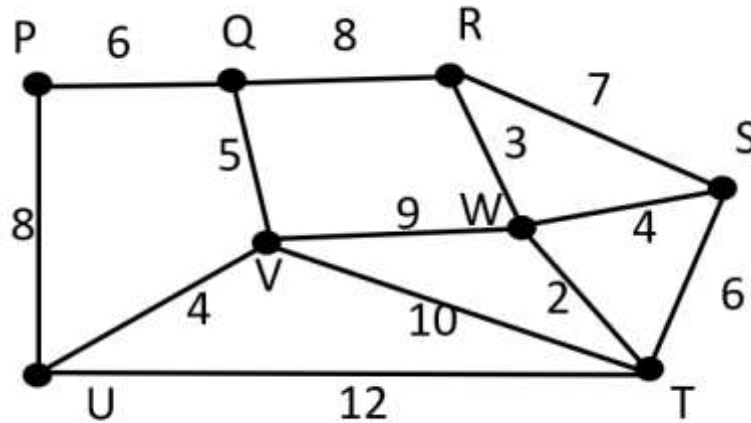
d) From the digits 2, 3, 4, 5, 6

i) how many numbers greater than 4000 can be formed? (4 marks)

ii) how many 4 digit numbers would be even? (3 marks)

Total: [25 marks]

3. a) A courier man needs to deliver parcels to each location as shown in the graph below. Each vertex represents different locations and the weight in the graph represents the distance in km. The courier man starts the journey at P and needs to end at S.



i) Identify all paths that passes through each vertex without repeating the same edge. (5 marks)

ii) From (i), identify the distance of each path. (5 marks)

iii) Find shortest distance between the paths. (1 marks)

b) The table shows the social media used by Eshu, Alia, Nero, Hui Lin dan Rayzal to communicate.

	Media sosial / Social media		
	1	2	3
Eshu	Rayzal, Hui Lin	Rayzal	
Alia		Hui Lin	Hui Lin
Nero	Hui Lin, Rayzal	Hui Lin, Rayzal	Hui Lin
Hui Lin	Nero, Eshu	Nero, Rayzal, Alia	Nero, Alia
Rayzal	Eshu, Nero	Hui Lin, Eshu, Nero	

- i) Represent the information in the table in the form of network using the given vertices. One social media represents an edge. (8 marks)
- ii) Who is the best person to introduce Hui Lin? Give your reason. (3 marks)
- iii) Which of the social media, is the most popular among them? Give your reason. (3 marks)

Total: [25 marks]

4. a) The function  $f$  is defined by  $f: x \rightarrow 3 - 4x$ . Find  $f^{-1}(-5)$  (5 marks)

b) In an arithmetic progression, the second term is 35 and the sum of the first ten terms is 140. Find the first term and the common difference. (8 marks)

c) A farmer has 5 600 chickens and 4 880 ducks. The farmer sells 240 chickens and 180 ducks to the wholesaler every day. After a few days, the number of chickens and the number of ducks left are the same. On what day did the number of chickens and the number of ducks left are the same? (8 marks)

d) It is given that  $\xi = \{x : x \text{ is an integer, } 30 \leq x \leq 40\}$ , set  $A = \{x : x \text{ is a multiple of } 3\}$ , set  $B = \{x : x \text{ is a number such that the sum of its two digits is odd}\}$  and set  $C = \{30, 32, 35, 39, 40\}$ . List all the elements of set  $(A \cup B)' \cap C$ . (4 marks)

Total: [25 marks]

**- END OF QUESTIONS -**

**List of Formula:**

**ALGEBRA**

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{mn}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$$

$$13 \quad S_\infty = \frac{a}{1-r}, |r| < 1$$