



UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET

COURSE CODE	: DGE 2133
COURSE	: MATHEMATICS III
SEMESTER/SESSION	: 1 – 2021/2022
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **SIX (6)** questions in SECTION A, **FOUR (4)** questions in SECTION B and **TWO (2)** questions in SECTION C. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 9 PRINTED PAGES INCLUDING COVER PAGE

SECTION A (50 MARKS)**INSTRUCTION: ANSWER ALL QUESTIONS.****QUESTION 1**

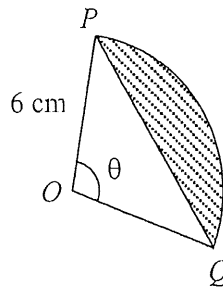
a) Convert each of the following angle to its equivalence.

i. $119^{\circ}13'$ to radian,

(1 mark)

ii. $\frac{2\pi}{5}$ rad to degree.

(1 mark)

b) Figure 1 shows a minor sector POQ with centre O .**Figure 1**Given that the length of arc PQ is 15 cm . Find:i. the perimeter of sector POQ ,

(2 marks)

ii. the value of θ , in radians,

(2 marks)

iii. the shaded area, in cm^2 .

(2 marks)

QUESTION 2

The third term of an arithmetic progression is 4 and the fourth term is 7. Find each of the following.

a) The common difference of the progression, d .

(2 marks)

b) The first term, a .

(2 marks)

c) The sum of the first 25 terms of the progression, S_{25} .

(2 marks)

QUESTION 3

Given a set of data,

5, 8, 12, 10, 5, 3, 7, 5, 20, 10, 3.

Calculate each of the following.

- a) The mode of the data. (1 mark)
- b) The mean of the data. (2 marks)
- c) The range of the data. (2 marks)
- d) The standard deviation of the data. (4 marks)

QUESTION 4

Table 1 shows the number of words typed by 70 participants in a Shorthand and Secretarial Workshop within the duration of 2 minutes.

Table 1

Number of words	Frequency, f
21 – 25	6
26 – 30	9
31 – 35	13
36 – 40	18
41 – 45	14
46 – 50	10

Calculate each of the following.

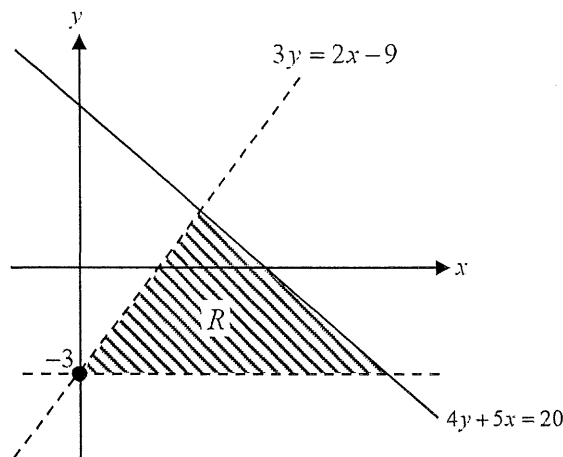
- a) The mode of the number of words. (2 marks)
- b) The median of the number of words. (3 marks)
- c) The interquartile range of the number of words. (5 marks)

QUESTION 5

- a) Given a sample set, $S = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$. A number is chosen at a random from the set S . Find the probability of a prime number is chosen. (3 marks)
- b) A bag contains 10 cards where each card is marked with an alphabet from the word, "COMPUTER". If a card is drawn at random, find the probability of a vowel. (3 marks)
- c) A box contains 5 red marbles and 9 green marbles. Sofea puts another 3 red marbles into the box and taken out 2 green marbles from the box. She picked a marble at random from the box. Calculate the probability of choosing a green marble. (3 marks)

QUESTION 6

- a) Write down three inequalities which define the shaded region R as shown in Figure 2.

**Figure 2**

(3 marks)

- b) Sketch and shaded the region that satisfies the linear inequalities $y \leq x$, $x + y < 4$ and $2y \geq x$.

(5 marks)

SECTION B (30 MARKS)

INSTRUCTION: ANSWER ALL QUESTIONS.

QUESTION 1

Figure 3 shows a straight-line graph of $\frac{y^2}{x}$ against x .

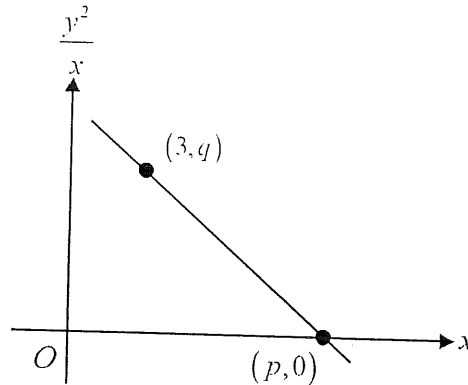


Figure 3

Given the line equation is $y^2 = 2x(10-x)$, calculate the values of p and q .

(5 marks)

QUESTION 2

Use graph paper to answer this question.

Aiman wants to buy a sized A and B painting to exhibited in his art gallery. The price of a sized A and B painting are RM 300 and RM 200 respectively. Aiman buys x units of sized A painting and y units of sized B painting. The purchase is based on the following constraints:

- I : The total allocation is RM 9,000.
 - II : The total number of the sized A and B painting must be more than 15.
 - III : The number of the sized B painting must exceed or equal to the number sized of A painting.
- a) Write down three inequalities, other than $x \geq 0$ and $y \geq 0$, that satisfies all the above constraints. (3 marks)
 - b) Hence, using a scale of 2 cm to 5 units on both axes, construct and shade the region **R** which satisfies all the above constraints. (4 marks)

QUESTION 3

Use graph paper to answer this question.

Table 2 shows the values of two variables, x and y , obtained from an experiment. Variables x and y are related by the equation $y = 2kx^2 + \frac{p}{k}x$, where p and k are constants.

Table 2

x	2	3	4	5	6	7
y	8	13.2	20	27.5	36.6	45.5

- a) Plot $\frac{y}{x}$ against x , using a scale of 2 cm to 1 unit on both axes. Hence, draw the line of best fit. (5 marks)
- b) Use the graph from (a) to find the value of
- k , (2 marks)
 - p , (2 marks)
 - y when $x = 1.2$, (2 marks)
 - x when $y = 6$. (2 marks)

QUESTION 4

There are 15 sweets in a bag consists of 5 toffees, 3 mints and 7 chocolates. Two sweets are chosen at random, without replacement. Find the probability that they are of the same type. (5 marks)

SECTION C (20 MARKS)

INSTRUCTION: ANSWER ALL QUESTIONS.

QUESTION 1

Table 3 shows the price indices for three components of electronic items used in making a type of smartphone.

Table 3

Components	Price index for the year 2019 based on the year 2016	Price index for the year 2021 based on the year 2016
<i>A</i>	112	140
<i>B</i>	110	<i>x</i>
<i>C</i>	<i>y</i>	110

- a) Find the price index of component *A* in the year 2021 based on the year 2019. (2 marks)
- b) Given the price of component *B* in the year 2016 is RM 5.00 and the price in the year 2021 is RM 6.35.
- Find the value of *x*. (2 marks)
 - Calculate the price of component *B* in the year 2019. (2 marks)
- c) The composite index for the cost of making the smartphone in the year 2019 based on the year 2016 is 125.5. The ratio of the cost of the components used are 5:3:12. Find the value of *y*. (2 marks)

QUESTION 2

A piece of wire is cut into n parts. The length of each part of the wire increases and forms a geometric progression. Given the length of the fourth part of wire is 9 times the length of the second part of wire.

- a) Find the common ratio of the progression, r . (3 marks)
- b) If the length of the last part of wire is $1,093.5\text{ cm}$ and the total length of the wire is $1,640\text{ cm}$, calculate:
- the value of n , (5 marks)
 - the length of the first part of wire, (2 marks)
 - the length of the fourth part of wire. (2 marks)

----- END OF QUESTIONS -----

FORMULA

Arc Length of Circle	$S = r\theta$
Area of Sector	$A = \frac{1}{2}r^2\theta$
Area of Segment	$A = \frac{1}{2}r^2(\theta - \sin\theta)$
Price Index	$I = \frac{P_1}{P_0} \times 100$
Composite Index	$\bar{I} = \frac{\sum I_i W_i}{\sum W_i}$
The n^{th} term Arithmetic Progression	$T_n = a + (n-1)d$
The n^{th} term Geometric Progression	$T_n = ar^{n-1}$
Sum of Arithmetic Progression	$S_n = \frac{n}{2}[2a + (n-1)d]$ or $S_n = \frac{n}{2}(a+l)$ where l = is the last term
Sum of Geometric Progression	$S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 1$
Gradient	$m = \frac{y_2 - y_1}{x_2 - x_1}$ or $m = -\frac{y - \text{intersection}}{x - \text{intersection}}$
Mean	$\bar{x} = \frac{\sum x_i}{N}$ or $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
Variance	$s^2 = \frac{1}{N-1} \left(\sum x_i^2 - \frac{(\sum x_i)^2}{N} \right)$
Standard Deviation	$s = \sqrt{\text{variance}}$
Interquartile Range	$IQR = Q_3 - Q_1$ where $Q_1 = L_{Q_1} + \left(\frac{\frac{n}{4} - F}{f_{Q_1}} \right) i$, $Q_3 = L_{Q_3} + \left(\frac{\frac{3n}{4} - F}{f_{Q_3}} \right) i$
Probability of an Event	$P(A) = \frac{n(A)}{n(S)}$

