



Institute of Certified Management Accountants of Sri Lanka

Incorporated by Parliament Act No.23 of 2009

PILOT PAPER



CAT 4: Quantitative Methods (QM)

INFORMATION:

1. Time allowed:
Reading– 15 minutes.
Writing - Three (3) hours
2. The total mark allowed for this paper is 100.
3. This paper has 11 pages.

INSTRUCTIONS:

4. This paper consists of three sections.
Section I: 25 Multiple Choice Questions (MCQs)
Section II: Question no. 01 (Compulsory Question)
Section III: Question no. 02 – 04 (Answer any two questions)
5. Answer only four (04) questions including Sections 1 and II
6. The answers should be in the English language.
7. Only non-programmable calculators are permitted to use.
8. The formula sheet will be provided.

**The answer key is given from page 12-14*

- 8) What will be the point of minimum of the function $f(x) = 2x^3 + 3x^2 - 36x + 10$:
- a) 1 b) 2 c) 3 d) 4
- 9) If the cost function of a company, $C(x)$ is given by $C(x) = 5x^2 + 3x + 50$, what is the marginal cost at $x = 20$:
- a) 103 b) 203 c) 200 d) 100
- 10) $\int (x - \frac{1}{2x})^2 dx$ is equal to:
- a) $\frac{x^3}{3} - x - \frac{1}{4x}$ b) $\frac{x^3}{3} + x - \frac{1}{4x}$
c) $\frac{x^3}{3} - x + \frac{1}{4x}$ d) $\frac{x^3}{3} - 1 - \frac{1}{4x}$
- 11) Which of the following is an example of primary data:
- a) Sales reports from the previous year
b) Survey responses collected directly from customers
c) Industry research reports
d) Government census data
- 12) What distinguishes grouped data from ungrouped data:
- a) Grouped data is numerical, while ungrouped data is categorical.
b) Grouped data is organized into categories or intervals, while ungrouped data is not.
c) Grouped data is collected first-hand, while ungrouped data is collected from secondary sources.
d) Grouped data is more accurate than ungrouped data.
- 13) Which of the following is an example of continuous data:
- a) Number of students in a class
b) Types of pets owned by households
c) Temperature readings in Celsius
d) Yes or no responses in a survey
- 14) Which of the following would be MOST suitable for displaying the proportions of a company's budget spent on advertising on different channels:
- a) Pie chart b) Bar chart
c) Line graph d) Histogram

Section II – (Compulsory Question)

Exam Structure

- One Scenario- Based Objective Test Questions.
- 20 marks in total

Question 01

B&J Ice Cream is a small restaurant selling various types of ice cream. From traditional favorites like creamy vanilla and rich chocolate to exotic delights such as tropical mango and tangy passion fruit, B&J Ice Cream offers a tempting array of flavors to satisfy customers. The cost function of vanilla ice cream is $TC = 30,000 + 2000Q$ (where Q is the number of units produced). B&J has found that the following equations give demand and supply curves for vanilla ice cream.

$$Q_d = 10,000 - 6P, \text{ and } Q_s = 2,800 + 3P, \text{ Where } P \text{ is the price of ice cream.}$$

(All the prices are in Rs. and the quantities are in units)

The number of Chocolate ice creams B&J has sold during the last 15 days is given below.

500, 200, 300, 800, 700, 600, 400, 1000, 500, 300, 200, 400, 600, 750, 350.

YOU ARE REQUIRED TO:

- 1.1. What is the demand for ice cream if the price of ice cream is Rs.500/-: **(02 Marks)**
- 1.2. If B&J wants to sell 6,400 ice creams, what is the price they should charge: **(03 Marks)**
- 1.3. What is the quantity of ice cream sold at equilibrium: **(03 Marks)**
- 1.4. What is the average cost of producing 1,000 units of vanilla ice cream: **(03 Marks)**
- 1.5. How many vanilla ice creams B&J must sell to maximize revenue: **(03 Marks)**
- 1.6. What is the mean number of chocolate ice creams sold during the last 15 days: **(03 Marks)**
- 1.7. State whether the below statements are true or false:

Statement	True/False
A table showing the age distribution of customers buying ice cream from B&J can be categorized under inferential statistics.	
To summarize the daily revenue of B&J, the number of classes in a frequency distribution depends on the number of days.	

(02 Marks)

- 1.8. Which of the following is the most suitable for representing a change of ice cream sales during the last 12 months:

a) Gantt chart b) Pie chart c) Bar chart d) Histogram

(01 Mark Each)

[Total 20 Marks]

Section III – (Optional Question)

Exam Structure

- Three Scenario-Based Objective Test Questions.
- 15 marks each and 30 marks in total
- Answer any two questions

Question 02

The Tab is a cafeteria that sells various items such as short eats, burgers, pastries, cake, soft drinks and hot drinks.

You are given the following information as well.

- Last Thursday a customer bought 4 Chinese rolls and 5 sandwiches for Rs.1,480/-. Another customer bought 5 Chinese rolls and 3 sandwiches for Rs.1200/-.
- The monthly fixed cost of producing a burger is Rs.150,000/-. and the variable cost of a burger is Rs.500/-. A burger is sold at Rs.800/-.
- The demand curve for soft drinks is given by the following equation:

$$D = -\frac{p^2}{100} + 300$$

YOU ARE REQUIRED TO ANSWER:

- 2.1. What is the price of a Chinese roll (in Rs.): **(02 Marks)**
- 2.2. What is the price of a Sandwich (in Rs.): **(02 Marks)**
- 2.3. How many burgers are to be sold per month by The Tab to make break-even: **(02 Marks)**
- 2.4. What is the total cost at the break-even quantity: **(02 Marks)**
- 2.5. What is the marginal cost of producing a burger: **(02 Marks)**
- 2.6. At what price the demand for soft drinks will be zero (in Rs.): **(02 Marks)**
- 2.7. What will be the demand for soft drinks if the unit price is Rs.10/-: **(01 Mark)**
- 2.8. What is the marginal revenue of soft drinks when the price is Rs.10/-: **(02 Marks)**

[Total 15 Marks]

Question 03

Sakura Enterprises is a small manufacturing company owned by Kamal Sundaram. Kamal is planning to expand the business of Sakura Enterprises.

YOU ARE REQUIRED TO:

Answer the following questions on Sakura Enterprises and Kamal's finances.

3.1. If Kamal wants Rs.3,000/- in four years' time, how much does he have to invest in an account paying interest of 6.5% compounded weekly:

(02 Marks)

3.2. What is the effective rate of interest of an investment made by Kamal if 9% is compounded semiannually (% interest rate):

(02 Marks)

3.3. If Kamal has invested Rs.100,000/- in an account paying a simple interest. For the first three years, the bank pays an interest of 4% and for the next 2 years bank pays an interest of 5%. How much money was in Kamal's account at the end of the 5th year (in Rs.):

(02 Marks)

3.4. If Kamal has received Rs.59,550.80/- for an investment of Rs.50,000/- made 3 years back in an account paying interest compounded annually, what was the interest rate:

(02 Marks)

3.5. For how long would Rs.50,000/- have to be left by Kamal in an account paying 4% simple interest p.a. to give a balance of Rs. 60,000/- (in years):

(02 Marks)

3.6. Kamal wants to deposit a certain sum in an account paying interest at 10% so that it will produce interest of Rs.120,000/- per year, to pay for maintenance of a machine. How much should he deposit (in Rs.):

(02 Marks)

3.7. Kamal wants to develop a fund to replace a machine in Sakura Enterprises after 15 years. He deposits Rs.100/- every month for 15 consecutive years in an account paying an interest of 9% p.a. What amount will be accumulated after those 15 years:

(02 Marks)

3.8. Which of following factors affect the amount of interest earned or paid in compound interest calculations:

a) Principal amount

b) Interest rate

c) Time period

d) Frequency of compounding

(01 Mark)

[Total 15 Marks]

Question 04

Leema Tea is one of the largest tea exporters in Sri Lanka. They manage a few tea estates in the Kandy district. In addition to tea, they manage rubber and palm oil plantations in Kalutara and Galle districts as well. Number of crepe rubber sheets produced in one of the divisions in an estate in Kalutara during 7 days are shown in the following table.

Day	1	2	3	4	5	6	7
Number of crepe rubber sheets	50	55	46	48	50	52	55

YOU ARE REQUIRED TO:

4.1. The following table shows the exports of Leema in 2023.

Item	Value of exports (in millions of Rs.)
Tea	400
Rubber	200
Palm oil	300

If a pie chart is used to represent these data, what is the value of the angle (in degrees) of the slice representing tea exports:

(01 Mark)

4.2. The number of Kgs of tea plucked by 21 employees of an estate managed by Leema in a day are given in the following table. Calculate the mean, median, and mode of the given data set.

Kgs of Tea	Number of employees
51-55	2
56-60	7
61-65	8
66-70	4
Total	21

- a) Mean -
- b) Median -
- c) Mode -

(03 Marks)

4.3. State the class boundaries of the first class.

(02 Marks)

4.4. Which of the following statements accurately differentiates class boundaries from class limits in a frequency distribution?

- a) Class boundaries are used to define the range of data points, while class limits are the midpoints of the classes.
- b) Class boundaries refer to the actual limits within which data values fall, while class limits are the smallest and largest values that define a class.
- c) Class boundaries are the midpoints between the upper limit of one class and the lower limit of the next class, while class limits are the smallest and largest values that define a class.
- d) Class boundaries are the smallest and largest values that define a class, while class limits refer to the actual limits within which data values fall.

(01 Mark)

4.5. Calculate the first, second, and third quartiles for the data set on the number of crepe rubber sheets produced:

- a) First quartile -
- b) Second quartile -
- c) Third Quartile -

(03 Marks)

4.6. What is the interquartile range for the data set on crepe rubber sheet production:

(01 Mark)

4.7. Calculate the sample standard deviation for the data set on crepe rubber sheet production:

(02 Marks)

4.8. State whether the below statements are true or false.

Statement	True/False
The median is unaffected by extreme values or outliers in a data set.	
The mode is always one of the numbers in data.	

(02 Marks)

[Total 15 Marks]

Question 05

Didly Farm is located in Dambulla along the Dambulu River. They grow and sell rice, vegetables, and fruit. They also have a farm shop for selling their products to the customers.

You are given the following information as well.

- a) A customer has paid Rs.3,500/- to buy 5kgs of Rose Rice and 6kgs of Fragrant Rice. Another customer has paid Rs.4,000/- to buy 4kgs of Rose Rice and 8kgs of Fragrant Rice.
- b) The monthly fixed cost of producing watermelon is Rs.120,000/- and the variable cost of a 1kg of watermelon is Rs.180/-. 1kg of watermelon is sold at Rs.300/-.
- c) The demand function for Kiri Samba is given by $D = p^2 - 20p + 100$
- d) A gardener of the farm has bought 10 packets of seeds from two different companies. Each pack contains 20 seeds and he has recorded the number of plants which grow from each pack.

Company A	20	5	20	20	20	6	20	20	20	8
Company B	17	18	15	16	18	18	17	15	17	18

- e) The mean salary of eight employees of the Didly Farm was Rs.15,000/-. When a new employee called Supun is taken on this calculation, the mean dropped to Rs.14,000/-.

YOU ARE REQUIRED TO:

- 5.1. What is the price of 1 kg of Rose Rice (in Rs.):
(02 Marks)
- 5.2. How many kgs of watermelon are to be sold per month by Didly to make break-even:
(02 Marks)
- 5.3. What is the marginal cost of producing 1 kg of watermelon:
(02 Marks)
- 5.4. At what price the demand for Kiri Samba will be zero (in Rs.):
(02 Marks)
- 5.5. State three central tendency measures :
(02 Marks)
- 5.6. What is the median number of plants grown from the seed packets bought from Company B:
(02 Marks)
- 5.7. What is the mode number of plants grown from the seed packets bought from Company B?
(01 Marks)
- 5.8. What is the salary paid to Supun (in Rs.):
(02 Marks)

[Total 15 Marks]

ANSWER KEY

Section I

Q. No	Answer	Q. No	Answer
01	C	14	A
02	B	15	C
03	A	16	D
04	A	17	C
05	C	18	D
06	B	19	B
07	C	20	B
08	B	21	B
09	B	22	B
10	A	23	C
11	B	24	B
12	B	25	A
13	C		

Section II

Question 01

- 1.1 7,000
- 1.2 600
- 1.3 5,200
- 1.4 2030
- 1.5 5,000
- 1.6 506.67

1.7 State whether the below statements are true or false.

Statement	True/False
A table showing the age distribution of customers buying ice cream from B&J can be categorized under inferential statistics.	False
To summarize the daily revenue of B&J, the number of classes in a frequency distribution depends on the number of days.	False

1.8 Bar chart

Section III

Question 02

- 2.1 Rs.120/-
- 2.2 Rs.200/-
- 2.3 Rs.500/-
- 2.4 Rs.400,000/-
- 2.5 500
- 2.6 Rs.173.21
- 2.7 Rs.299/-
- 2.8 297

Question 03

- 3.1 Rs.2313.53
- 3.2 9.2%
- 3.3 Rs.122,000.00
- 3.4 interest rate% 6
- 3.5 5
- 3.6 Rs.1,200,000/-
- 3.7 37,840.58
- 3.8
 - Principal amount
 - Interest rate
 - Time period
 - Frequency of compounding

Question 04

- 4.1 160
- 4.2
 - Mean 61.33
 - Median 61.4375
 - Mode 61.5
- 4.3 50.5 and 55.5
- 4.4 c
- 4.5
 - First quartile - 48
 - Second quartile - 50
 - Third Quartile - 55
- 4.6 7
- 4.7 True
- 4.8 True

Question 05

- 5.1. Rs.250
- 5.2. 1000
- 5.3. 180
- 5.4. Rs.10
- 5.5. 84,100
- 5.6. Mean, Median , Mode
- 5.7. 20
- 5.8. Rs.6,000