බස්නාහිර පළාත් අධ්‍යාපන දෙපාර්තමේන්තුව
மேல் மாகாணக் கல்வித் திணைக்களம்
Department of Education - Western Province

තෙවන වාර පරීක්ෂණය - 2026
மூன்றாம் கால சோதனை - 2026
Third Term Test - 2026

ශ්‍රේණිය தரம் Grade	විෂයය பாடம் Subject	පත්‍රය வினாத்தாள் Paper	පැය மணித்தியாலம் Hours
12	වාණිජ සංඛ්‍යානය Business Statistics	II	3

Instructions

- Read the instructions on the question paper carefully and follow them.
- Answer only five out of the six questions.
- Calculators are not allowed.

01.

a) Explain primary data and secondary data used in a statistical study, giving suitable examples.

(3 marks)

b) State whether each statement is True or False, giving reasons.

i. In the self-enumeration method, a shedule is used to record data.

ii. Drawing conclusions about a population based on sample information is the main function of descriptive statistics.

iii. The success of the self-enumeration method mainly depends on the educational level of the respondents.

iv. In a statistical study, individual items are considered.

(4 marks)

c)

i. What is a Lorenz Curve? Explain two situations in which Lorenze curve can be used.

(2 marks)

ii. The percentages of income received by employees in two industries are:

Percentage of Employees	A	B
0	0	0
20	2	5
40	10	20
60	20	40
80	40	60
100	100	100

(a) Draw the Lorenz curves for both industries on the same graph.

(b) Which industry shows greater inequality in income distribution?

(c) What percentage of total income is received by the 40% of employees in each industry?

(5 marks)

d) Explain the following charts with one example each.
   (a) Pie Chart
   (b) Component Bar Chart (3 marks)

e) The annual profits (Rs. million) of a company are given below. Draw a simple bar chart for the information. (3 marks)

Year	Profit
2014	5
2015	3
2016	4
2017	-0.5
2018	1.5

02.

a) What are the characteristics of a good measure of central tendency? Explain these characteristics with reference to the Mean, Median and Mode. (4 marks)

b) The weight distribution of children in a certain age group in kilograms is given below.

Weight (kg)	No. of Children
25-29	35
30-34	45
35-39	70
40-44	100
45-49	90
50-54	80
55-59	50
60-64	30

i) Calculate the Mode, Median, Mean and Standard Deviation of the above distribution. (6 marks)
ii) Calculate the Coefficient of Skewness and comment on it. (2 marks)
iii) Calculate the Coefficient of Variance and comment on it. (2 marks)

c) Define the Geometric Mean and state one practical application of it. (2 marks)

d) The calculated measures of monthly salaries of employees in factories P and Q are given below.

Factory	P	Q
No. of employees	525	595
Mean salary	475	430
Variance	9000	10000

i) Which factory pays the higher average monthly salary? (2 marks)
ii) In which factory are the salaries more consistent? (2 marks)

03.

a) State the most appropriate measure of central tendency for each situation and briefly explain the reason.

(a) Finding the average speed of four students who travel to school by bicycles from their homes.

(b) Finding the average time taken to supply water from the main water tank of a city to five locations situated at equal distances.

(c) Finding the average annual sales growth of a business over the past five years

(3 marks) .

b)

i) Define the weighted Mean and explain two practical applications of it. (2 marks)

ii) An organization conducts an examination consisting of six subjects to recruit an employee. The candidate with the highest weighted average will be selected. The marks obtained by a person who applied for this in each subject are given below.

Subject	Sinhala	Maths	English	Intelligence	General Knowladge	IT
Marks	68	52	45	34	58	70

The weight of Sinhala is three times that of each other subjects while Mathematics and English each carry double the weight of other subject and weights of other subjects are equal. Calculate the weighted average of candidate according to the relative importance of subjects.

c) The following frequency distribution shows number of electricity consumption units of 100 families. If the median is 48.25, find the values of a and b.

No. of electricity consumption units	0-20	20-40	40-50	50-70	70-100
No. of families	10	a	30	b	15

(4 marks)

d)

i) Calculate the percentile coefficient of kurtosis for the above distribution and comment.

(04 marks)

ii) Draw a box and whisker plot for the above distribution and briefly comment on the nature of the distribution.

(02 marks)

04.

a) Define Regression Analysis and explain its importance in business. (3 marks)

b) The information about the number of units produced in a certain factory and the cost of a unit produced is given below.

No. of production units (Thousands)	0	1	2	3	4	5
Units cost (Thousands)	70	65	50	40	25	20

i. Draw a scatter diagram and describe the relationship between two variables. (2 marks)

ii. Fit the least squares regression line and interpret its coefficients. (5 marks)

iii. Estimate the unit cost when production is 3,000 units. (1 mark)

iv. Calculate and interpret the coefficient of determination. (2 marks)

v. Calculate and interpret the correlation coefficient. (2 marks)

c) Distinguish between the product moment correlation coefficient and the rank correlation coefficient. (2 marks)

d) The following table shows how two judges rated the same type of food produced by 10 companies. Calculate spearman's rank correlation coefficient and explain your results.

Company	A	B	C	D	E	F	G	H	I	J
First Judge	8	7	6	1	9	2	5	4	3	10
Second Judge	9	10	3	4	8	1	5	2	6	7

(3 marks)

05. a)

i) Explain the probability of occurring an event. State two differences between deterministic experiments and random experiments. (2 marks)

ii) Define the relative frequency approach to probability and state two limitations. (2 marks)

b) In a sample space S , two events A and B are

i) defined, $P(A) = 0.7$, $P(B)' = 0.6$, $P(A' \cap B') = 0.1$

Find ,

$P(A \cup B), P(A \cap B), P(A/B'), P(B'/A')$ (2 marks)

ii) In a department where two employees work, the probability that both employees take leave on a given day is 1/7, and the probability that only one employee takes leave is 1/5. Assuming their leave decisions are independent, find the probability that at least one employee **does not take** leave on that day. (3 marks)

c) X and Y are two mutually exclusive and collectively exhaustive events defined in sample space S. If $P(X) = 10X^2 + 5X - 1$ and $P(Y) = 1 - 2X$, find the value of "X" and calculate the probability of X and Y.

(3 marks)

d)

i) State the Law of Total Probability. (1 mark)

ii) In a multinational company, a junior executive has an 80% chance of being promoted if the annual sales target is achieved, and a 30% chance of promotion if the target is not achieved. The probability of achieving the annual sales target is 0.75.

Find the probabilities of,

(a) Achieving the sales target but not being promoted. (2 marks)

(b) Not achieving the sales target but being promoted. (1 mark)

(c) Being promoted. (2 marks)

(d) Given that the executive was promoted, the probability that the sales target had been achieved. (2 marks)

06. a)

i) Define a probability distribution and state the conditions that a discrete probability distribution must satisfy. (2 marks)

ii) A discrete random variable Y can take only the values 1, 2, 3 and 4. Verify that $f(y) = \frac{y^2}{30}$ is the probability mass function of Y and find the probability that Y takes an even value. (3 marks)

b)

i) Explain the Binomial random experiment and write the probability mass function of the Binomial distribution. (2 marks)

ii) A factory produces items with a 10% probability of being defective. From a random sample of 10 items, find the probabilities that more than 50% of the items are defective and the probability that exactly two items are defective. (3 marks)

c)

i) Define the Poisson probability distribution. (2 marks)

ii) In an urban area where solar panels are widely used, the average number of power failures is 10 per four-week month. For one week, find the probabilities that:

(a) No power failure occurs.

(b) At most two power failures occur.

(c) At least one power failure occurs.

(3 marks)

d)

i) State two characteristics of the Normal distribution. (1 mark)

ii) The time (in minutes) taken by students to complete an examination follows a Normal distribution with mean μ and standard deviation σ. The probability that a randomly selected student takes more than 68 minutes is 0.1587, and the probability that another student takes more than 76 minutes is 0.0228.

Find:

(a) The mean and standard deviation of the distribution.

(b) The probability that a randomly selected student completes the examination in less than 55 minutes.

(4 marks)