University of Kelaniya – Sri Lanka

Centre for Distance and Continuing Education

Faculty of Commerce and Management Studies

Bachelor of Business Management (General) Second Year Examination (External) – 2021

March – 2024

BMGT E2045 – Statistics for Management

No. of Questions: Eight (08) Time: 03 hours

Answer any **five (05)** Questions.

Non Programmable Calculators are allowed.

Question No. 01

a) "Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data". Comment on this statement.

(05 Marks)

b) Explain the difference between an observation and a variable with examples.

(05 Marks)

c) State whether each variable given below is quantitative or qualitative.

i. Gender

ii. Number of subjects in your degree

iii. Occupation

iv. Flight time from London to Sri Lanka

v. Marital status

(05 Marks)

d) Distinguish discrete and continuous data.

(05 Marks)

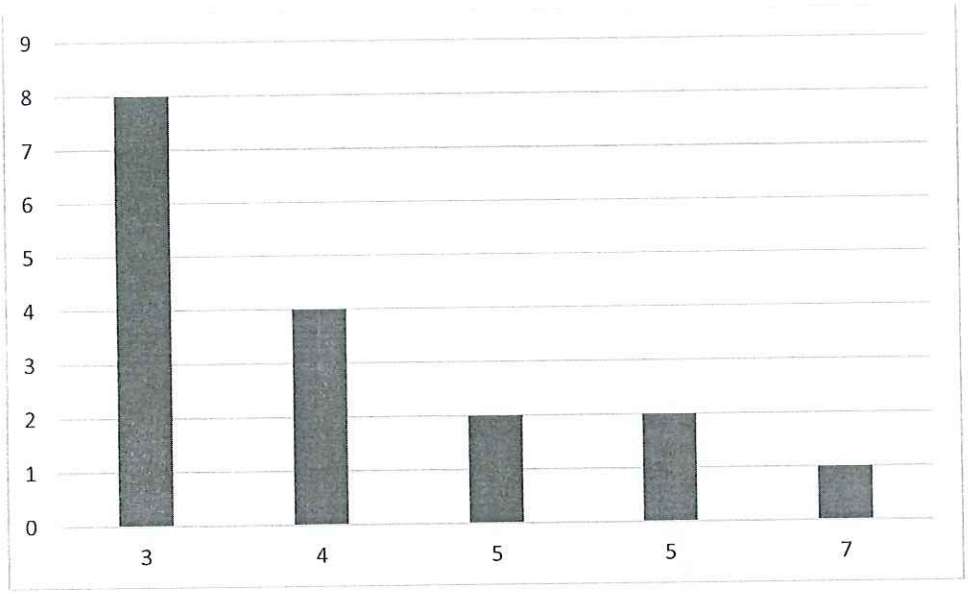
(Total 20 Marks)

Question No. 02

a) Suppose that in a Housing Scheme of 50 people, one person earns Rs. 500 000 per month, and the other 49 each earn Rs. 100 000 per month. What is the better measure for the average earnings of the 50 people? Justify your answer numerically.

(05 Marks)

b) Describe the relationship between the mean and the median of the following distribution.



(05 Marks)

c) A grocery store is interested in how much money, on average, their customers spend each visit to the food section. Using their store records, they draw a sample of 1000 visits and calculate each customer's average expenditure on food.

Based on the above scenario, identify each of the following

i. Population
ii. Sample
iii. Parameter
iv. Ststistic
v. Variable

(10 Marks)

(Total 20 Marks)

Question No. 03

a) The events A, B, and C are such, A and B are independent, Band C are independent and A and C are mutually exclusive. Their probabilities are P (A) =0.3, P(B) =0.4 and P(C) = 0.2. Then, calculate the probabilities of the following events occurring,

i. Both A and C

ii. Both B and C

iii. At least one of A or B

(10 Marks)

b) If Nimal and Sunil have an equal chance of winning a point in a game. Then,

i. Draw a tree diagram to represent the situation after a total of 3 points have been contested. Indicate on your diagram the probabilities and all the outcomes associated with each branch.

ii. Calculate the probability that Nimal would have won all 3 points.

iii. Calculate the probability that Sunil would have won 2 points, and Nimal would have won 1 point of the 3 points contested.

(10 Marks)

(Total 20 Marks)

Question No. 04

Following are probabilities describing a group of A/L students in a certain school.

P(M) = the probability that the student is male

P(F) = the probability that the student is female

P(C) = the probability that the student in the commerce section

P(S) = the probability that the student in the science section

The following contingency table summarizes the survey results of 1000 students.

	Commerce Section	**Science Section**	**Total**
Male	(iii)	200	(ii)
Female	125	193	(i)
Total	(iv)	(v)	1000

Using the above information, answer the following questions.

i. Calculate the missing values in the table $[(i), (ii), (iii), (iv), (v)]$

ii. Write the symbol for the probability that a student selected at random is both female and a science section student.

iii. Write the symbol for the probability that a student selected at random is in the commerce section, given that the student is male.

iv. Given an example of a joint event.

v. Given an example of an event of conditional probability.

vi. If a student is selected at random, what is the probability that the student is female?

vii. If a student is selected at random, what is the probability that the student is male and in the commerce section?

viii. If a student is selected at random, what is the probability that the student is in the commerce section, given that the student is female?

ix. If a student is selected at random, what is the probability that the student is male, given that he is in the science section?

x. Are the events 'male' and 'commerce section' independent or not? Justify your answer numerically.

(02 Marks for each)

(Total 20 Marks)

Question No. 05

a) A factory produces components of which 1% are defective. The components are packed in the boxes of 10.

i. A box is selected randomly; find the probability that the box contains exactly one defective component.

ii. A box is selected randomly; find the probability that there are at least 2 defective components in the box.

iii. Using a suitable approximation, find the probability that a batch of 250 components contains between 1 and 4 defective components.

(10 Marks)

b) Suppose the heights of adult females are normally distributed with a mean of 149cm and a standard deviation of 8 cm.

i. Find the probability that a randomly selected adult female has a height greater than 159 cm.

ii. Find the probability that a randomly selected adult female has a height between 139 cm and 169 cm.

(05 Marks for each)

(Total 20 Marks)

Question No. 06

An online retailer believes that 93% of the visitors to its website will make a purchase. A researcher in the marketing department believes the actual percentage is lower than claimed. The researcher examines a sample of 200 visits to the website and finds that 180 of visits resulted in a purchase. At the 1% significance level, the researcher is interested in determining if the proportion of visits to the website that result in a purchase is lower than claimed. Based on the above information, answer the following questions.

i. State null and alternative hypotheses.

ii. State appropriate test statistics. Show work by giving the correct formula with the correct values substituted in the formula.

iii. Find the appropriate critical value and rejected region for this hypothesis testing. Draw an appropriate picture and show your work.

iv. Write a conclusion for this test in the context of this situation.

(05 marks for each)

(Total 20 marks)

Question No. 07

As the regional manager of a dinner-delivering business, Mr. Perera is interested in understanding how the income of the households in the region affects dinner-delivering sales. He collected the following data.

Household	Average Monthly Income (in 1000 rupees)	Dinner Sales (in 1000 rupees)
1	500	50
2	400	35
3	450	35
4	350	25
5	250	20
6	475	38
7	520	40
8	220	10
9	275	12
10	300	15
11	310	10
12	380	30
13	570	55
14	290	25
15	295	22
16	405	40
17	415	42
18	390	37
19	290	20
20	420	38

You are given the following regression (excel) output. You are required to answer the questions based on this output.

SUMMARY

OUTPUT

Regression Statistics	
Multiple R	0.9162343
R Square	0.839485293
Adjusted R Square	0.83056781
Standard Error	5.3908843
Observations	20

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2735.8406	2735.840596	94.13925728	1.418E-08
Residual	18	523.109404	29.06163354		
Total	19	3258.95			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-16.74604	4.961430	-3.3752449	0.0033713	-27.1696	-6.322464
Income per month (Rs'000)	0.1244398	0.012825	9.7025387	1.418E-08	0.0974944	0.151385

i. Identify the independent and dependent variables.

ii. What is the regression equation?

iii. Interpret the regression equation

iv. What does the p-value for the income variable mean?

v. What is the interpretation of the regression line's slope?

vi. What does the model predict for dinner delivery sales in the region with an average household income of Rs. 600,000

vii. What can you conclude about the estimated intercept?

viii. What is R^2 value?

ix. What is the interpretation of the R^2?

x. What is the Root Mean Square Error?

(02 Marks for each)

(Total 20 Marks)

Question No. 08

a) What are the four components of a time series, and briefly describe them.

(10 Marks)

b) The table below shows the data of sale of nine years.

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sales (100000 units)	65	95	115	63	120	100	150	135	172

i. Fit a free hand curve to the time series values for above given data.

ii. Use free hand method to estimate the trend line.

(05 Marks for each)

(Total 20 Marks)