GWANDA STATE UNIVERSITY

FACULTY OF BUSINESS SCIENCE AND MANAGEMENT

DEPARTMENT OF MARKETING

BUSINESS STATISTICS

BMA 1204

Examination Paper

MAY 2023

This examination paper consists of 5 printed pages

Time Allowed: **3 hours**

Total Marks: 100

Examiner's Name: Mr. R. G. Moyo

INSTRUCTIONS

Answer **ALL** questions in Section A and **ANY THREE** questions in Section B

ADDITIONAL REQUIREMENTS

Scientific calculator

Graph papers

Statistical Tables

SECTION A: 40 marks

A1. Define the following terms as they are used in business statistics

(a) Probability [2]

(b) Sample [2]

(c) Standard deviation [2]

(d) Data collection [2]

(e) Measures of central tendency [2]

A2. (a) Differentiate between data and Information [4]

(b) Briefly describe the data collection and analysis procedures [4]

(c) Differentiate between a sample and population. [2]

A3. Since January 2023, Zimbabwe has had serious power cuts due to poor water inflows into the Kariba dam. Power shortages are also caused by aging coal-fired power stations that have repeatedly broken down and this has greatly affected power supply to Gwanda State University. Due to these power shortages, GSU has acquired a heavy duty Diesel generator. The probability that GSU has electricity on any given day is 0.32. In the case that there is no electricity, a generator is switched on. Independently, the probability that student 'X' will revise his school work on any particular day is 0.25.

(a) Represent the above scenario by a means of a tree diagram. [5]

(b) Find the probability that student 'X' will not revise his school work. [4]

(c) Find the probability that the generator is switched on and student 'X' will not revise his school work. [4]

A4. Gwanda State University part 1 marketing students have devised a business strategy of selling T-shirts to all university students. Their worry is on the T-shirt sizes that they should supply. One of the students suggested that they randomly select 10 students and ask them their ages in-order to estimate the average sizes of T-shirts that they should supply. The results of the experiment are summarized below

18, 25, 23, 27, 24, 19, 26, 18, 21, 23

Calculate the sample standard deviation. [7]

SECTION B: Answer any 3 questions from this section.

A5. A farmer supplies potatoes daily to a hypermarket. The mass of potatoes supplied depends on the day's demand. The masses of potatoes supplied and the fuel consumed by the delivery truck per trip were recorded for 8 such trips. The resulted are displayed on the following table

Mass in tonnes (x)	0.7	1.8	2.5	3.2	4.1	5.4	6.3	6.9
Fuel volume in litres (y)	10.0	11.2	12.2	13.0	13	14.2	15.6	15.8

(a) Plot a scatter diagram on graph paper showing the masses of potatoes on the horizontal axis and the volume of fuel consumed on the vertical axis [5]

(b) Find the equation of the regression line of y on x [5]

(c) Fit your equation of the regression line on your scatter plot. [3]

(d) Use your fitted line to estimate the mass of potatoes that may be transported by 14 liters of fuel. [2]

(e) Find the product moment correlation coefficient and comment on it. [5]

A6. (a) The performance of a group of 24 marketing students who sat for their final second semester examinations in Statistics and Advertising obtained the following results.

Statistics (BMA 1204)	**Advertising (BMA 1209)**
36, 45, 40, 60, 71, 66, 53, 42, 35, 54, 35, 43, 72, 37, 39, 34, 49, 43, 75, 58, 67, 59, 36, 67	88, 89, 30, 34, 48, 49 59, 65, 67, 78, 41, 70, 54, 66, 39, 49, 37, 59, 45, 63, 52, 75, 38, 38

(i) Construct a back to back stem and leaf diagram to present these two sets of data [4]

(ii) Use a graph paper to draw a pair of box and whisker plots to represent these two sets of data [5]

(iii) Comment on the performance of the students in these two examinations. [2]

(b) GSU Admission department receive an average of 10 applicants for undergraduate admissions per week. Assuming that the number of applicants follow a Poisson distribution, calculate

(i) the probability that the department will receive more than four applications on any given fortnight. [4]

(ii) the probability that the Admissions department will receive exactly 5 applications in a given hour given that the university opens from Monday to Friday, 8 hours a day. [5]

A7. Use **APPENDIX A** to answer the following questions
APPENDIX A is an SPSS output for a regression analysis of 2 variables. The researcher wanted to compare the linear relationship that exist between the price of a car and its age.

(a) Of the 2 variables, state the dependent and the independent variable. [2]
(b) Write down the equation of the regression line of the price of a car on age. [3]
(c) Use the regression line to estimate the price of a 6.5 year old car. [4]
(d) Write down the 95% confidence interval for the regression line constant. [3]
(e) Write down the coefficient of determination and comment on the linear relationship that exist between the price and age of a car in layman's terms. [4]
(f) Comment on the significance of the age of the car in determining the price of a car. [4]

A8. (a) After advertising our new product, 30% of the population showed an interest in our product. A random sample 42 customers is taken, find the probability that more than 3 customers will like our product [5]
(b) The masses of packages from a particular machine are normally distributed with a mean of $200g$ and a standard deviation of $2g$. Find the probability that a randomly selected package from the machine weighs
(i) less than $196.5g$ [3]
(ii) more than $200,5g$ [3]
(iii) between $196.5g$ and $197.5g$ [5]
(c) Using the information given in part (b), calculate the 95% confidence interval for the mean [4]

END OF QUESTION PAPER

"*Mathematics may not teach us how to add love or subtract hate*
But it gives us hope that every problem has a solution" Anonymus

APPENDIX A

Regression

[DataSet0]

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Age[b]	.	Enter

a. Dependent Variable: Price

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.834[a]	.696	.658	2.4416

a. Predictors: (Constant), Age

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	109.277	1	109.277	18.331	.003[b]
	Residual	47.692	8	5.961		
	Total	156.969	9			

a. Dependent Variable: Price

b. Predictors: (Constant), Age

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	20.468	2.970		6.892	.000	13.620	27.317
	Age	-2.361	.552	-.834	-4.281	.003	-3.633	-1.089

a. Dependent Variable: Price