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University Examinations 2022/2023

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF
MASTER OF BUSINESS ADMINISTRATION, MASTER IN ENTREPRENEURSHIP AND
MASTER IN SUPPLY CHAIN MANAGEMENT

SMB 5100/BBS 5206: STATISTICS FOR BUSINESS/ STATISTICS FOR SUPPLY CHAIN MANAGEMENT

DATE: AUGUST 2023

TIME: 3 HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE (30 MARKS)

- a) Highlight the following terms as used in statistics
- i. Probability distribution (1 mark)
 - ii. Random and non-random sampling (2 marks)
 - iii. Variable (1 mark)
- b) Distinguish between descriptive and inferential methods in data analysis for a business/
economic research (4 marks)
- c) Family income is believed to be normally distributed with a mean of \$25,000 and a
standard deviation of \$10,000
- i. If the poverty level is \$10,000, what percentage of the population lives in
poverty? (3 marks)



MUST is ISO 9001:2015 and



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- ii. A new tax law is expected to benefit “middle income” families, those with income between \$20,000 and \$30,000. What percentage of the population will benefit from this law? (3 marks)
- d) The following table shows the summary statistics for the daily wages of two types of workers

Worker's Type	Daily Wages	
	Mean	Standard deviation
I	\$100	\$20
II	\$150	\$24

- i. Compare these two daily wages distributions (5 marks)
- e) If 8% of the bulbs produced by a machine are defective, what is the probability that out of 13 bulbs chosen at random
- i. At most one will be defective (4 marks)
- ii. At least two will be defective (2 marks)
- f) Explain the utility of descriptive methods in business research (3 marks)
- g) Highlight two advantages of sampling over census (2 marks)

QUESTION TWO (20 MARKS)

- a) A development engineer is interested in determining if varying the cotton content in a synthetic fiber affects the tensile strength. He runs a completely randomized experiment with five levels of cotton percentage and five replicates. The data is tabulated as below

	Observed tensile strength(lbs/in ²)					
	15	7	7	15	11	9
	20	12	17	12	18	18



	25	14	18	18	19	19
	30	19	25	22	19	23
	35	7	10	11	15	11

Analyse the data and draw conclusion using $\alpha = 0.01$ level of significance (12 marks)

- b) Explain the four levels of measurement and give examples where they are used in business research (8 marks)

QUESTION THREE (20 MARKS)

- a) Five samples of a ferrous-type substance are to be used to determine if there is a difference between a laboratory chemical analysis and an X-ray fluorescence analysis were applied. Following are the coded data showing the iron content analysis

	Sample				
Analysis	1	2	3	4	5
x-ray	2.0	2.0	2.3	2.1	2.4
Chemical	2.2	1.9	2.5	2.3	2.4

Assuming the populations is normal, test at the 0.05 level of significance whether the two methods of analysis give, on the average, the same results (12 marks)

- b) Explain the condition that make it necessary to approximate the normally distributed data by student “t” distribution (2 marks)
- c) Distinguish the following
- Type one and type two errors (2 marks)
 - Statistic and a parameter (2 marks)
 - Point and interval estimator (2 marks)

QUESTION FOUR (20 MARKS)

- a) It was suspected that job satisfaction is independent of income. A study was conducted to ascertain the assertion. The results of the study are given below



Income (x) (shs)	Job satisfaction (y)			
	Very dissat	Little satis	Mod.satis	Very satis.
<5000	2	4	13	3
5000-15000	2	6	22	4
15000-25000	0	1	15	8
>25000	0	3	13	8

Construct a test to test the hypothesis H_0 :x and y are independent v/s H_a :x and y are dependent (10 marks)

- b) The following table shows the daily wages of a random sample of construction workers.

Calculate its mean, median and mode

Daily wages(\$)	Number of workers
200-399	5
400-599	15
600-799	25
800-999	30
1000-1199	18
1200-1399	7
Total	100

- i. Calculate the mean and standard deviation (7 marks)
- ii. Determine the 95% confidence interval for the mean wages (3 marks)

QUESTION FIVE (20 MARKS)

- a) Two percent of the output of a machine is defective. A lot of 300 pieces will be produced
 - i. Determine the probability that at least two items will be defective (4 marks)
 - ii. State the mean of this distribution (1 mark)



- b) An economist was investigating on factors influencing saving in a household. In a sample of 27 households, the following model was established

$$y_i = 5.85 + 0.79 x_1 - 0.52 x_2 - 0.82 x_3$$

$$S.E (2.3), (0.28) (0.24) (0.47)$$

$$r^2 = 0.73$$

Where $x_i, i = 1,2,3$ are covariates; household income, household size and household head education level respectively

Interpret the results of this study model by describing the model performance and influence of the covariates to the response variable (9 marks)

- c) Machine A and machine B produce identical components and it is required to test if the mean diameter of the components is the same. A sample of 144 from machine A had a mean of 36.4mm and a standard deviation of 3.6mm. While a random sample of 255 from machine B had a mean of 36.9mm and a standard deviation of 2.9mm. at 5% level of significance, test whether the means significantly differ (6 marks)

