



*(Knowledge for Development)*

**KIBABII UNIVERSITY**  
**UNIVERSITY EXAMINATIONS**  
**2020/2021 ACADEMIC YEAR**  
**THIRD YEAR SECOND SEMESTER**  
**MAIN EXAMINATION**

**FOR THE DEGREE OF BACHELOR OF COMMERCE**

**COURSE CODE:BCO 318:**

**COURSE TITLE:MANAGERIAL STATISTICS**

**DATE: 18<sup>TH</sup> FEBRUARY,2021      TIME: 2.00PM-4.00PM**

TIME: 2 Hours

Answer Question One in Section A and Any other TWO (2) Questions in Section B

## SECTION A

### QUESTION ONE(COMPULSORY)

The Global Leadership program enrolls students directly from undergraduate studies and others after having obtained some work experience. The students with work experience claim that they do better than their peers because of their experience in the business world. However, the students right out of school claim they do better than their peers because they have more recent academic experience. The Global Leadership program is not interested in which group does better, but simply in determining whether the two groups' performance is the same or not. To test this, the program took a random sample of students' grades (from a central university database)

$n_1 = 300$  from the experienced group with a standard deviation of 100 and  $n_2 = 250$  with a standard deviation of 150. Let  $\mu_w$  denote the population mean GPA for the students with work experience and let  $\mu_N$  denote the population mean GPA for students with no work experience. Let  $\bar{W}_x = 78$  and  $\bar{N}_x = 85$  represent the corresponding sample means respectively.

- i) Write down the null hypothesis and alternative hypothesis that were tested in this study, both in words and using the appropriate notation. ( 5 marks )
  
- ii) Test the hypothesis that both groups of students perform equally. Use a 0.10 level of significance. (Assume that student performance is approximately normal.)

(15 marks)

- iii) A producer of electrical wire is testing the force required to pull spliced wires apart. Ideally, each should withstand onat least 20 kg of pull force, and the required forces have always been found to be normally distributed. If the producer has determined that the mean of the pull forces is  $\bar{x} = 25.5$  and standard deviation of 2.5.

(a) Find a 98% confidence interval for the average required pull force. (5 marks)

b) Find the probability of a wire withstanding at least 20 pounds of pull force.

(5 marks)

## SECTION B

### QUESTION TWO

- i) In a university election the students president, 52% of the voters supported candidate A, and 48% supported candidate B. Of the supporters of candidate B, 47% of the voters are females, and 53% are males. Suppose 100 voters of each candidate are surveyed assuming the survey uses simple random sampling.

What is the probability that the survey will show a greater percentage of candidate A than candidate B? (11 marks)

- ii) Clearly explain the features of a good estimator. (4 marks)

### QUESTION THREE

Last year, five randomly selected students took a mathematics aptitude test before they began their statistics course. In the table below, the  $x_i$  column shows scores on the aptitude test. Similarly, the  $y_i$  column shows statistics grades. The last two columns show deviations scores - the difference between the student's score and the average score on each test. The last two rows show sums and mean scores.

| Student     | $x_i$      | $y_i$      | $(x_i - \bar{x})$ | $(y_i - \bar{y})$ |
|-------------|------------|------------|-------------------|-------------------|
| 1           | 95         | 85         | 17                | 8                 |
| 2           | 85         | 95         | 7                 | 18                |
| 3           | 80         | 70         | 2                 | -7                |
| 4           | 70         | 65         | -8                | -12               |
| 5           | 60         | 70         | -18               | -7                |
| <b>Sum</b>  | <b>390</b> | <b>385</b> |                   |                   |
| <b>Mean</b> | <b>78</b>  | <b>77</b>  |                   |                   |

Determine:

- i) The linear regression equation that best predicts statistics performance, based on the mathematics aptitude scores? (5 marks).
- ii) If a student scored an 80 on the aptitude test, what grade would we expect him/her to make in statistics? (5 marks).
- iii) Explain the use of linear regression in business. (5 marks)

#### QUESTION FOUR

- i) A national consumer magazine reported the following correlations.
  - The correlation between car weight and car reliability is -0.30.
  - The correlation between car weight and annual maintenance cost is 0.20.

Which of the following statements are true?

- I. Heavier cars tend to be less reliable.
- II. Heavier cars tend to cost more to maintain.
- III. Car weight is related more strongly to reliability than to maintenance cost. (2 marks)

ii) In the final exam for the managerial statistics administered to 600 students the mean is 50 marks with a standard deviation of 20. Find:

- a. The number of students securing between 30 and 70. (5 marks)
- b. The number of students exceeding scoring 65 (5 marks)

#### QUESTION FIVE

i) Assuming the standardized values (call them X) have a standard normal distribution, using the table, find the following probabilities (to four decimal places):

- (a)  $\Pr(X < 0.5)$
- (b)  $\Pr(X < 1.5)$
- (c)  $\Pr(X < 2.5)$  (6 marks)

ii) If the average sales price of 21 sold bales of maize flour is sh.350, 000 with a standard deviation of sh.20, 000, construct a 95% confidence interval for the average sales price of the population of equivalent quantity. (5marks).

- ii) A common question among many students is whether gender is independent of education level. A random sample of 395 people were surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey is summarized in the following table:

|               | <b>High School</b> | <b>Bachelors</b> | <b>Masters</b> | <b>Ph.D.</b> | <b>Total</b> |
|---------------|--------------------|------------------|----------------|--------------|--------------|
| <b>Female</b> | 60                 | 54               | 46             | 41           | 201          |
| <b>Male</b>   | 40                 | 44               | 53             | 57           | 194          |
| <b>Total</b>  | 100                | 98               | 99             | 98           | 395          |

Are gender and education level dependent at 5% level of significance? In other words, given the data collected above, is there a relationship between the gender of an individual and the level of education that they have obtained? (4 marks)