



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS

EES 301: STATISTICS FOR ECONOMISTS II

DATE: 16/11/2020

TIME: 2:00 – 4:00 PM

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## INSTRUCTIONS:

- (i) Answer question one (Compulsory) and any other two questions
- (ii) Do not write on the question paper
- (iii) Show your working clearly
- (iv) Where  $\alpha$  has not been given, use  $\alpha=0.05$

## QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the following terms as applied in statistics. Give examples
  - i) Discrete probability distribution (2 marks)
  - ii) Continuous probability distribution (2 marks)
  - iii) Uniform probability distribution (2 marks)
- b) Describe the central limit theorem (2 marks)
- c) The marketing department at Machakos University plans to install new equipment which will improve the efficiency of their operations. It has been found that the average telephone message is 150 seconds, with a standard deviation of 15 seconds. Before they can decide if such an investment would be cost effective, they require you to determine the probability that the mean of a sample of 35 calls will be:
  - i) Between 145 and 150 (2 marks)
  - ii) Between 145 and 155 (2 marks)
  - iii) Greater than 155 (2 marks)

- d) Differentiate between a point estimate and an interval estimate. Use examples (4 marks)
- e) Suppose Machakos University, Marketing department has given you five products to market. The new strategy is to market all products taking three at each promotional tour to minimize the cost of marketing. The cost of product promotion is as follows;

| Product | Cost (Kshs) |
|---------|-------------|
| A       | 2000        |
| B       | 3000        |
| C       | 3000        |
| D       | 4000        |
| E       | 1000        |

**Required:**

- i) What is the number of product combinations (samples)? (1 mark)
- ii) Show the sampling distribution of the mean cost (3 marks)
- iii) Generate the probability distribution (2 marks)
- iv) Compute Mean and corresponding standard deviation (4 marks)
- f) Describe two significance of the error term (2 marks)

**QUESTION TWO (20 MARKS)**

- a) A parent of a form four graduate from Machakos High intends to take his son to pursue bachelor's degree in either Machakos University or Strathmore University. Upon consultation on the cost, they are in dilemma between the two universities. The amount required to complete the four year course in Strathmore University is Kshs. 2,000,000 with annual charges for administration being Kshs. 1300. At Machakos University, the amount required is a quarter less that of Strathmore University with an annual administration of Kshs. 4000. However, for parents to remit the school fees in either University, the management estimates the probability of the student completing the four year course to be 0.025 and 0.00065 for Strathmore and Machakos University respectively. You are required to advise the parent giving the appropriate justification. (8 marks)
- b) Explain the difference between mathematical and statistical models. Illustrate (4 marks)
- c) Describe three characteristics of chi square distribution and highlight three circumstances when it can be applied (6 marks)
- d) Highlight two cases where permutations can be applied (2 marks)

**QUESTION THREE (20 MARKS)**

- a) Differentiate between descriptive statistics and statistical inference (4 marks)
- b) What do you understand by the term sample distribution of the mean (2 marks)
- c) In a study conducted by students from economics class to establish the relationship between preference for petrol station in Machakos town and the reasons provided by the consumers, the following data was obtained.

| Reasons for preference | No. of Customers |           |
|------------------------|------------------|-----------|
|                        | Shell            | Oil Libya |
| Location               | 32               | 8         |
| Quality service        | 12               | 2         |
| Cleanliness            | 13               | 3         |
| Personal attention     | 56               | 35        |
| Mechanical service     | 11               | 13        |
| Staff Appearance       | 6                | 9         |

Required:

- i) Determine the sample size in this study (2 marks)
- ii) Determine the expected sample results (2 marks)
- iii) Calculate the chi square statistic (4 marks)
- iv) Determine the degrees of freedom (2 marks)
- v) Test the hypothesis on whether preference depends on the reasons given (4 marks)

**QUESTION FOUR (20 MARKS)**

- a) Explain any two characteristics of probabilities (2 marks)
- b) Explain are the main assumptions of the error term (4 marks)
- c) Discuss the five essential steps or procedures of hypothesis testing (10 marks)
- d) Explain four assumptions of Ordinary Least Square (OLS) model (4 marks)

**QUESTION FIVE (20 MARKS)**

- a) Explain weaknesses of correlation coefficient ( $r$ ) and coefficient of determination ( $R^2$ ) (5 marks)
- b) A random sample of six car models had the following fuel consumption figures in KM/Litre. 18.6, 18.4, 19.2, 20.8, 19.4 and 20.5  
Find a 90% confidence interval for the population mean fuel consumption (5 marks)
- c) A census of retail shop in a particular month revealed that the mean monthly sales was Kshs 2500. A random sample of 16 shops taken in the following month had mean monthly sale of Kshs 2660 and a standard deviation of Kshs 480. Can we conclude that the mean monthly sales have increased since census? (10 marks)