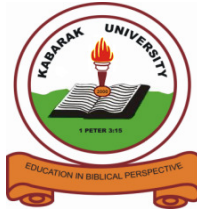**KABARAK** **UNIVERSITY**

UNIVERSITY EXAMINATIONS
MAIN CAMPUS/NTC

SECOND SEMESTER, 2016/2017 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE

BMGT 220: BUSINESS STATISTICS II

STREAM: Y2S2   **TIME: 9.00-11.00 AM**

EXAMINATION SESSION: APRIL   **DATE: 21/04/2017**

INSTRUCTIONS

> ➢ Answer question ONE and any other TWO questions. Graph paper will be provided.

Question One (thirty marks)

a) Using suitable examples, explain difference a discrete variable and a continuous variable.

(4marks)

b) Explain the circumstances under which we use a one-tailed tests rather than two-tailed tests during significance testing.   (4marks)

c) A batch of 5,000 electric lamps have a mean life of 1,000 hours and a standard deviation of 75 hours. Assuming a normal distribution:

   i) How many lamps will fail before 925 hours?   (3marks)

   ii) How many lamps will fail between 950 and 1000 hours?   (4marks)

   iii) Given the same mean life, what would the standard deviation have to be to ensure that not more than 20% of the lamps fail before 916 hours?   (4marks)

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

d) A trade-association needs to know the mean number of hourly paid employees per member firm. To estimate this, the association takes a random sample of 225 member firms and finds a sample mean of 8.31 hours and standard deviation 4.80 hours. Construct the 95% confidence interval for the population mean for the trade association. What happens at a lower confidence level? (4marks)

e) The following data are the result of a historical study of the number of flaws found in a porcelain cup produced by a manufacturing firm. Use these data to answer the questions that follow.

Flaws	Probability
0	0.461
1	0.285
2	0.129
3	0.087
4	0.038

    i)   Show that the characteristics of probability distributions are satisfied. (1mark)

    ii)   Determine the expected number of flaws   (3marks)

    iii)   Compute the variance and standard deviation of flaws.   (3marks)

Question 2 (twenty marks)

a) Briefly explain the Student's t-test, pointing out its salient features.   (4marks)

b) With the help of diagrams illustrate what is a sampling distribution of means.   (4marks)

c) The number of houses sold each month by a top real estate agent is a Poisson random variable X with $\lambda = 4$.

i) What are the expected value and standard deviation of X? (4marks)

ii) What is the probability that the agent will sell between 2 and 6 houses in a given month?

(4marks)

iii) What is the probability that she will sell 5 or more houses in a given month? (4marks)

Question 3 (twenty marks)

a) Explain how a scatter diagram helps in studying the correlation between two variables.

(3 marks)

b) Suppose that the mean operating costs in cents per mile from a random sample of 9 vehicles (in a large fleet) turns out to be 26.8 and a value of s equal to 0.8655. Estimate the mean operating costs of the fleet at the 95% confidence interval. (4marks)

c) Justify the use of the t-distribution in part (b) above and explain the effect on the width of the confidence interval, of using z- value rather than t-value. (4marks)

d) The probability that a salesman makes a sale on a visit to a prospective client is 0.2. What is the probability that, in 2 visits, of:

    i) making no sales (2marks)

    ii) making more than one sale (2marks)

e) Records show that 60% of students pass their examinations at the first attempt. Justify the use of the normal approximation to the binomial and calculate the probability that at least 65% of a group of 200 students will pass at the first attempt. (5marks)

Question 4 (twenty marks)

a) "Sampling is necessary under certain conditions" Explain this statement by giving examples.

(5marks)

b) Two research workers classified some people in income groups on the basis of sampling studies. Their observed results are as follows:

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

Page 3 of 4

Investigators	Income groups			
	Poor	Middle	Rich	Total
A	160	30	10	200
B	140	120	40	300
Total	300	150	50	500

i) Determine the expected sample results. (3mks)

ii) Calculate the chi-square statistic. (5mks)

iii) Determine the degrees of freedom. (2mks)

iv) By conducting a significance test at the 5% level, show that the sampling technique of at least one research worker is defective. (5marks)

Question 5 (twenty marks)

a) Explain the properties of a good estimator and the significance of this. (4marks)

b) With the aid of diagram, illustrate the relationship between the confidence limits, confidence interval and confidence level. (4marks)

c) The general relationship between height in inches (x) and weight in kg (Y) is given by the regression model in the form $Y = a + bX$ is given below:

$$Y` = 10 + 2.2 X$$

i)State the values of a and b and interpret them. (4marks)

ii) What would be the expected weight for a person whose height is 65 inches? (3marks)

iii) Calculations show that sample correlation coefficient $r = +0.674$ and coefficient of determination $r^2 = 0.4543$. Interpret these results. (4 marks)

d)In light of your interpretation in part c (iii) would you consider the regression model a good fit? (1mark)