



**KABARAK**

**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2008/2009 ACADEMIC YEAR**

**FOR THE DEGREE OF BACHELOR OF COMMERCE &  
BACHELOR OF ECONOMICS & MATHEMATICS**

**COURSE CODE:** BMGT 220/ECON 222

**COURSE TITLE:** BUSINESS STATISTICS II

**STREAM:** Y2S2

**DAY:** TUESDAY

**TIME:** 11.00 – 1.00 P.M.

**DATE:** 12/8/2008

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**INSTRUCTIONS:**

1. Answer questions **ONE** and any other **TWO** questions.
2. Question **ONE** carries **30 Marks** while the other questions carry **20 Marks** each.
3. Illustrate where possible

**PLEASE TURN OVER**

### **QUESTION ONE**

- (a) (i) What is binomial distribution? **(3mks)**
- (ii) Suppose an insurance agent has five contacts and he believes that for each, the probability of making a sale is 0.4. Determine the probability distribution for the experiment. **(5mks)**
- (b) (i) What is normal distribution? **(3mks)**
- (ii) The time taken by a member of readers to complete a certain book is normally distributed with mean of 150 minutes and a standard deviation of 30 minutes. Calculate the probability that the selected reader will take between 120 and 210 minutes to complete the reading. **(5mks)**
- (iii) Suppose we have a firm that is engaged in two lines of production. Factory X produces regular margarine and factory Y produces premium margarine. Past performance shows that mean monthly production of X is 130,000Kgs with a standard deviation of 10,000Kgs while Y has mean of 50,000Kgs and a standard deviation of 5,000Kgs. Assuming in June 2007, the production manager reports 150,000Kgs production in X and 62,500Kgs production in Y, which factory was managed more efficiently? **(5mks)**
- (c) (i) Why do we find it necessary to incorporate the error term in a statistical model? **(2mks)**
- (ii) Explain the stages involved in a statistical research methodology **(7mks)**

### **QUESTION TWO**

- (a) Distinguish between type I and type II errors **(4mks)**
- (b) Before an increase in the value added tax (VAT) on Malta energy drink, 800 people out of a sample of 1000 were Malta takers. After an increase in VAT, 800 people were found to be drinkers of Malta in a sample of 1200. Is there a

significant decline in the consumption of Malta after the increase in VAT at 1% level of significance? **(8mks)**

- (c) The manager of Trans-National Bank in Nakuru thinks that customers who operate Current Accounts save on average as much as customers who operate Savings Accounts. A first random sample of 100 customers who operate Current Accounts is taken and its mean is found to be 420. In the other sample of 80 customers operating Savings Accounts had mean of 400. Assuming the respective standard deviations are 70 and 70 ( $G_1 = 70$  and  $G_2 = 70$ ), is there any difference between the two categories of account operators? **(8mks)**

### **QUESTION 3**

- (a) In market investigations, when operations of households are surveyed by mail questionnaires, it is important to achieve the highest response rate possible. One of the tricks is to improve response by including an inducement question in the questionnaire which is intended to raise the respondents' willingness to fill the questionnaire. Questionnaires encompassing on inducement question on the importance of recreational facilities in a town were posted to a sample of 250 households and yielded 101 responses. An identical number of questionnaires but without an inducement question were sent to an independent random sample of 250 households producing 75 responses. Test the null hypotheses that the two population proportions of responses would be the same against the alternative that response would be greater with inducement. **(10mks)**
- (b) In attempting to determine the causes of the rapid increase in the cost of medical care over the last twenty years, a government agency needs to estimate the mean fee for various operations. Suppose that a random sample of 250 observations on consultancies yields the following results.

$$\bar{X} = \text{Ksh.}370, \sigma = 52.25$$

- (i) Construct a 95% confidence interval of the current mean consultancy fee.

(4mks)

- (ii) Suppose 20 years ago a similar study using 150 observations yielded the following confidence interval, estimate:

$$\text{Ksh.135} < \mu < \text{Ksh.155}$$

Find the values of standard deviation,  $\sigma$ , and mean,  $\bar{X}$ , used to construct this confidence interval (6mks)

#### **QUESTION 4**

- (a) When is the chi-square statistic applicable in statistical analysis? (3mks)
- (b) The proprietor of Lowland hospital in Nakuru town is concerned about the loss of customers to his hospital. He has clandestine information that most patients are preferring Highland hospital as opposed to his. He decided to contract a private researcher who sent out 200 questionnaires to the patients and received the following information:

<b><u>Reasons for preference</u></b>	<b><u>Highland hospital</u></b>	<b><u>Lowland hospital</u></b>
Location	32	8
Quality of service	12	2
Cleanliness	13	3
Personal attention	56	35
Staff qualifications	11	13
Staff appearance	6	9

- (i) Determine the expected sample results (3mks)
- (ii) Calculate the chi-square statistic (6mks)
- (iii) Determine the degrees of freedom (1mk)
- (iv) Assuming that the researcher permits a 5% chance of incorrectly concluding that the reasons given for hospital preference are related to the

choice of the hospital when this is not the case, test the relevant hypothesis of independence. **(4mks)**

- (c) What is the relationship between chi-square and F-statistics? **(3mks)**

**QUESTION 5**

- (a) (i) What is correlation?
- (ii) Given the following information on the relationship between supply and price

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

Calculate and interpret the product-moment correlation coefficient. **(10mks)**

- (b) The following table indicates the amounts spent by a certain company on employee training and its annual profits over a period of six years

<b>Year</b>	<b>Training Expenditure (X)</b>	<b>Annual Profits (Y)</b>
1995	50	310
1996	110	400
1997	40	300
1998	50	340
1999	30	250
2000	20	200

- (i) Calculate the least squares regression line **(8mks)**
- (ii) Interpret the results **(2mks)**