EGERTON   **UNIVERSITY**

UNIVERSITY EXAMINATIONS
NJORO CAMPUS

ACADEMIC YEAR 2013/2014
FOURTH YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ENGINEERING.

WEEN 410-ENGINEERING STATISTICS

STREAM: AGEN,WEEN,ICEN,CEEN   **TIME:** 2 HRS

DAY: MONDAY, 3 – 5 P.M.   **DATE:** 20/01/2014

INSTRUCTIONS: Answer question **ONE** and any other **TWO** questions.

Question one-Compulsory(30 marks)

(a). Distinguish between the following terms:

   (i)   Discrete and continuous variables

   (ii). Raw and array data.

   (iii). Independent and mutually exclusive events

   (iv). parameter and statistic

                                                        8 marks

(b). Consider the following frequency distribution.

X	12	13	14	15	16	17	18	20
f	4	11	32	21	15	8	5	4

Calculate (i) Mean

         (ii)Mode

         (iii) Median

         (iv) Standard deviation   8 marks

(c Two dice are rolled and the sum is recorded. Let A be the event that the sum is 5 and B

be the event that the value on the second die is less or equal to 3. Find the following:

$$(i)\ P(A)$$
$$(ii)\ P(B)$$
$$(iii)\ P(A \cap B)$$
$$(iv)\ P\left(\frac{A}{B}\right)$$
$$(v)\ P(A \cup B)$$

                 8 marks

(d).A factory finds that on the average 20% of the bolts produced by a given machine will

be defective. Suppose that ten bolts are selected at random from the day's production

of this machine, find the probability that:

   (i). exactly two will be defective

   (ii). at least three will be defective   (6 marks)

Question two(20 marks)

(a). In an experiment to predict a person's weight using the size of his shoe, the following

data was obtained:

Shoe size(X inches)	9.5	9.6	10.5	10.5	11	8.5	9.5	10
Weight(Y kgms)	70	78	76	90	80	72	81	75

   (i).Draw a scatter diagram

(ii)Find the least squares regression line of weight on shoe.

(iii).Predict the weight of a person whose shoe size is 12 inches.

(iv). Calculate the product-moment correlation coefficient and interpret your results.

16 marks

(b). The following frequency distribution shows the weights of people selected at

random:

Weight	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	15	10	11	12	7	3	5

Draw a less than ogive and use to predict the median.

(4 marks)

Question three- 20 marks

(a). A survey showed that most students at Egerton University sleep for a mean number of 6 hours a day with a standard deviation of 1.5 hours. If the number of sieeping hours is normally distributed, what proportion of students sleep for:

(i) less than 4 hours

(ii) more than 8 hours

(iii) between 4.5 and 7 hours   (10 marks)

(b). If the number of fish a person catches per hour in a certain lake is a random variable

having a Poisson distribution function with $\lambda = 2.8$. Find the probability that a person

fishing there for one hour will catch:

(i). No fish

(ii). At least two fish

(iii). At most three fish given that there are at least two fish

10 marks

Question four-20 marks

(a). In investigating several complaints concerning the weight of the "NET WT. 500gm" jar of local brand of peanut butter, the Kenya bureau of standards (KEBS) selected a sample of 64 jars. The sample had a mean of 490 gms and a standard deviation of 2 gms. Find

> (i) 99%
>
> (ii) 80%

confidence interval for the true mean weight of the " net wt.500 gm" jar.

8 marks

(b). A purchaser of copper wires selected at random of 10 specimens from a normally distributed large lot and recorded their breaking strength (kg wt) as follows.

578, 572, 570, 568, 572, 578, 570, 572, 596, 548

Let μ be the actual mean breaking strength of the copper wires. Test at 1% level of significance, the hypothesis

$$H_0 : \mu = 578$$
$$vs$$
$$H_1 : \mu \neq 578$$

12 marks

Question five-20 marks

(a). Consider the experiment of tossing a coin four times. Find the probability that:

(i). the last outcome is a tail

(ii).the first three outcomes are heads

(iii).the first three outcomes are tails and the last one is a head.

(iv).the last outcome is a head if the first three are tails.

8 marks

(b). The frequency distribution of the annual salaries of district commissioners in a certain province is as follows:

Salaries(kf,000)	1-3	4-6	7-9	10-12	13-15	16-18	19-21
Frequency	2	4	6	17	8	3	1

Calculate:

    (i). mean

    (ii). Mode

    (iii) Median

    (iv) Standard deviation   12 marks

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