MURANG'A UNIVERSITY COLLEGE

(A constituent College of Jomo Kenyatta university of Agriculture and Technology)

SCHOOL OF ENGINEERING AND TECHNOLOGY

DIPLOMA IN BUILDING

SEB 1361: ENGINEERING MATHS VI

SUPPLEMENTARY EXAM 2016

Date: 30th June 2016 **Time: 2 hours**

INSTRUCTIONS: Answer Question ONE and any other TWO questions

QUESTION ONE (30 MARKS – Compulsory)

a) Given 516, 487,503,495 and 489 calculate the arithmetic mean (2mks)

b) Briefly distinguish between the following terms

(i) Discrete and continuous variable (2 mks)

(ii) Event and experiment (2 mks)

(iii) Population and sample (2 mks)

c) A random variable X has the following probability distribution

X	20	20	4	50
P(X=x)	0.2	M	0.2	n

If E(x)=34; find the value of m and n (5 mks)

d) Define the tem statistics and list at least 4 of it functions (5 mks)

e) Briefly explain the following terms as used in probability theory

(i) Sample space

(ii) Conditional probability

(iii) Tree diagram

(iv) Independent event (4 mks)

f) A manufacturer of airplane parts knows from the last experiment that the probability is 0.80 that an order will be ready for shipment on time, and it is

0.72 that an order will be ready for shipment on time and will also be delivered on time. Calculate the probability that such an order will be delivered on time given that it was ready for shipment on time

(4 mks)

g) Represent the following data on a pie chart

City	A	B	C	D
No. of People	4200	2000	2200	1600

(4 mks)

QUESTION TWO (20 MARKS)

a) Define the term probability (2 mks)

b) A bag contains five red and three white billiard balls. If two balls are selected at random with replacement, what is the probability that one of each colour is drawn. (6 mks)

c) The table below shows the teachers in statistics department at MRUC

	Male	**Female**
Professor	9	12
Reader	11	8
Lecturer	13	14

If the head of the department is chosen at random, what is the probability that the person chosen is;

(i) A female or a professor? (3 mks)

(ii) A male or a lecturer? (3 mks)

d) Given the following pairs of observations of x and y. calculate the correlation coefficient of x and y.

(15, 44), (20, 43), (25, 45), (30, 37), (40, 34) , (50, 37) (6 mks)

QUESTION THREE (20 MARKS)

a) The administrator of Apollo Hospital conducted a survey of the number of days patients stayed in the hospital following an operation. The data are given as below;

Hosp. stay (days)	1 -3	4 – 6	7 – 9	10 - 12	13 - 15	16 - 18	19 – 21	22 - 24
Frequency	32	108	67	28	14	7	3	1

Compute :i) Mean (3 mks)

ii) Range (2 mks)

iii) Standard deviation (5 mks)

iv) State the modal class and compute the mode (5 mks)

50 – 59	60 – 69	70 - 79	80 - 89	90 - 99	100 – 109	110 - 1109
6	9	15	25	13	7	5

Construct a histogram and the corresponding frequency polygon on the graph (5 mks)

QUESTION FOUR (20 MARKS)

a) Gross weekly earnings (y in Ksh. per week) for a sample of male clerical workers of varying ages (x, incomplete years) in a large company are as follows:

Earnings , y	215	259	348	387	534	660	726	$\sum y^2 = 1632011$
Age, x	18	20	23	28	35	45	55	$\sum x^2 = 8313$

You are given $\sum xy = 116, 210$

(i) Plot a scatter diagram of these data and comment on their suitability for a simple linear regression analysis (3 mks)

(ii) Obtain the coefficient of correlation between x and y (4 mks)

(iii) Write down the models for:

a) Simple linear regression of y on x

b) Simple linear regression x on y

Define your rotation clearly. Which mode is better suited to it the variables and data defined in the table above (5mks)

(iv) Fit the simple linear regression model of y on x to the above data, find the equitation of the fitted regression line, draw this line on your scatter diagram, and use the equation to estimate the mean weekly earnings at age 50. (7 mks)

(v) Your line manager asks you to use your model to estimate the mean weekly earnings at age of 70. How would you answer him? (1 mks)

QUESTION FIVE (20 MARKS)

a) The number of calls per minute received in a telephone switch board follows a poisson distribution with mean 0.6. find the probability that;

(i) No call will be received in the first 10 minutes (4 mks)

(ii) More than two calls will be received in a period of 40 minutes (6 mks)

b) It is expected that 10% of production from a continuous process will be defective. Find the probability that in a sample of 10 units chosen at random;

(i) Exactly two will be defective and

(ii) At least will be defective (10mks)

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END OF SEMESTER EXAM **April 2016**

INSTRUCTIONS: Answer Question ONE and any other TWO questions

QUESTION ONE (30 MARKS – COMPULSORY)

a) Define the term statistics and list two limitations of statistics (4 mks)

b) Explain briefly the different types of data giving an example in each case (6 mks)

c) Two events A and B are independent. Given that p(A) = 0.4 and P(A∪B) = 0.7 find P(B) (2 mks)

d) If the mean of y, 17,24,32,45 is y+6. Find the value of y. (4 mks)

e) Represent the following data showing infant, mortality in different citites by a pie diagram

Cities	A	B	C	D	E
Infant Mortality	275	325	250	90	65

(6 mks)

f) Differentiate between the following terms

Regression and Correlation (4 mks

g) Given 3,6,8,12,8,6,15,8,9,7. State the mode, median and the range. (4 mks)

QUESTION TWO (20 MARKS)

a) Consider the following data set.

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

Fit a least square line to the Data, hence obtain;

(i) The regression coefficient of Y on X and of X on Y. (8 Mks)
(ii) The estimated value of Y when X=10 and of X when Y=5 (2 Mks)

b) The following table shows the frequency distribution of the Number of Milk packets per month by 50 households in Kibera.

No.of pkts of Milk	0-10	10-20	20-30	30-40	40-50	50-60
No.of households.	5	10	5	10	12	8

Using the Data Calculate;

i. Mean (3mks)
ii. Mode (4 mks)
iii. Median (3 mks)

QUESTION THREE (20 MARKS)

a) What is a measure of Variation in statistics (2 mks)
b) Consider the frequency table below.

Class Interral	8-12	13-17	18-22	23-27	28-32	33-37
Frequency	3	10	12	9	5	1

Calculate;

(i) 15^{th} Value (2 mks)
(ii) 90^{th} Percentage (3 mks)
(iii) Quartile Deviation (6 mks)
(iv) Coefficient of Quartile Deviation (2 mks)
(v) Mean Deviation (5 mks)

QUESTION FOUR (20 MARKS)

a) Explain the following terms as used in probability.
(i) Sample space
(ii) Mutually exclusive events
(iii) Exhaustive events
(iv) Independent events
(v) Classical probability. (5 mks)

b) Suppose that 60% of all households in a certain community subscribe to newspaper 1, 80% subscribe to newspaper 2 are 50 % subscribe to both. If a household is selected at random, find the probability it subscribes to:

(i) At least one of the two newspapers (3 mks)

(ii) Exactly one of the two (2 mks)

b) (i) Calculate the coefficient of correlation between x and y for the following data

X	-3	-2	-1	0	1	2	3
Y	9	4	1	0	1	4	9

(8 mks)

ii) Comment on the value calculated in (i) above (2 mks)

QUESTION FIVE (20 MARKS)

a) A sample of 51 people were asked to record the distance they had travelled by car in a given week. The distances to the nearest km are shown below.

67 76 85 42 93 48 93 46 52 72

77 53 41 48 86 78 56 80 70 70

66 62 54 85 60 58 43 58 74 44

52 74 52 82 78 47 66 50 57 87

78 86 94 63 72 63 44 67 68

81

(i) Starting with the internal 40 – 49, construct a frequency distribution table for the data (4 mks)

(ii) Draw a histogram and plot a frequency polygon on the same graph (6 mks)

b) The marks obtained by 8 applicant in the subjects of mathematics and Accountancy examinations were as follows:

Applicant	A	B	C	D	E	F	G	H
Mark in Maths	15	20	28	12	40	60	20	80
Mark in Accounts	40	30	50	30	20	10	25	60

(6 mks)

c) For a particular set of data $x_1, x_2, \ldots x_{100}$ and $\sum x_i = 550$, $\sum x_i^2 = 3250$ and $\sum x_i^3 = 19{,}750$. Say whether the data set is positively or negatively skewed or symmetrical (4 mks)