

**KENYA POLYTECHNIC UNIVERSITY COLLEGE**

**SCHOOL OF HEALTH SCIENCES AND TECHNOLOGY**

**DEPARTMENT OF COMMUNITY AND PUBLIC HEALTH**

**DIPLOMA IN COMMUNITY AND PUBLIC HEALTH**

**END OF STAGE 2 EXAMINATION – YEAR 2**

**NOVEMBER 2011**

**STATISTICS**

**TIME 2 HOURS**

**Instructions to candidates**

This paper consists of two sections A and B

Section A is compulsory – Answer **ALL** questions in this section

Answer any **THREE** questions from section B

**This paper consists of 6 printed pages**

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**SECTION A - Compulsory (40 MARKS)****Answer ALL questions in this section**

1) Given the following set of scores; 3, 9 and 27 calculate;

(a) Geometric mean (2 marks)

(b) Harmonic mean (2 marks)

2) Determine the absolute mean deviation for the frequency distribution in the table below

Scores (x)	Frequency (f)
10 - 20	2
20 - 30	4
30 - 40	4
40 - 50	8
50 - 60	6
60 - 70	3
70 - 80	2

(6 Marks)

3) Define the following terms as applied in biostatistics

i. Statistics (2 Marks)

ii. Sample (2 Marks)

iii. Population (2 Marks)

4) Obtain the first four terms of the expression  $(1 + \frac{1}{2}x)^{10}$  in ascending power of X

(2 marks)

ii) Find the value of  $(1.005)^{10}$  correct to 4 decimal place

(2 marks)

5) Distinguish between the following statistical terms

(a) Qualitative and quantitative variable (2 Marks)

(b) Independent and dependent variable (2 Marks)

6) The heights of boys aged 14 years are given below

Heights (in cms) 145.8, 146, 147.2, 148, 150.6, 151.5, 152.2, 155, 157.5

Using an assumed mean of 150.6, find the mean height of the boys

(4 Marks)

7) In how many ways can a committee of five persons be chosen out of nine persons?  
(2 Marks)

8) A dice is thrown twice in succession; find the probability of 2 and 5 appearing  
(2 Marks)

9) Nephropathy was observed in 100 cases of each doss of diabetics, divided into 4 classes as per severity of disease.

Class	I	II	III	IV
Observed frequency	8	15	14	7

Find whether this equality in different classes is due to severity

(  $\chi^2_{0.05, 3} = 7.81$ ) (4 Marks)

10) The mid year population of a city was 4,000,000. In the same year the number of live births was 12,000, the number of deaths 6,400 and the number of infant deaths 1500.

Calculate;

(a) Crude birth rate (1 Mark)

(b) Crude death rate (1 Mark)

(c) Infant mortality rates (2 Marks)

### **SECTION B (60 MARKS) Answer any THREE questions**

11 a) Calculate the general fertility rate and the gross reproduction rate from the following data. Assume that for every 100 girls 104 boys are born

Age group	No of women	Age specific fertility rate
15-19	21,000	92.0
20-24	19,000	165.0
25-29	16,500	152.0
30-34	14,500	140.0
25-39	12,500	90.0
40-44	10,200	45.0
45-49	4,500	16.0

(12Marks)

b) Find the different arrangements that can be mode using all the letters of the word

MISSISSIPPI (4 Marks)

c) A mixed technologists team consisting 5 biochemists and 6 biotechnologists is to be chosen from 7 biochemists and 9 biotechnologists. Determine the number of ways that this can be done (4 Marks)

12 a) The scores obtained by 30 students in Biostatistics test marked out of 20 are as shown below

Scores X	8	9	10	11	12	14	15	17	18	20
No of Students	2	3	4	4	5	3	3	3	2	1

Determine the,

- (a) the mode and the mean of the scores obtained.
- (b) the variance and the standard deviation.

(10 Marks)

b) Ten competitors in a voice test are ranked by 3 judges in the following data:

NB:  $R_1$  denotes rank due to judge 1  
 $R_2$  denotes rank due to judge 2  
 $R_3$  denotes rank due to judge 3

Competitor's number	$R_1$	$R_2$	$R_3$	
1	1	3	6	
2	6	5	4	
3	5	8	9	
4	10	4	8	
5	3	7	1	
6	2	10	2	
7	4	2	3	
8	9	1	10	
9	7	6	5	
10	8	9	7	

Use the method of rank correlation to gauge which pair of judges have the nearest approach to common likings in voice. (10 Marks)

13 a) Calculate the correlation coefficient and obtain the lines of regression for the following data

Z	1	2	3	4	5	6	7	8	9	
Y	8	9	11	10	12	14	13	15	16	(8 Marks)

b) Obtain an estimate of Y which should correspond on the average to

$$X=5.5$$

(2 Marks)

c) Show that for any two events A and B

$$P(A/B) = (P(A) - P(A \cap B)) / P(B)$$

(4 Marks)

d) Given the following data;

X	6	7	7	8	8	8	9	9	10
Y	5	5	4	5	4	3	4	3	3

Fit the regression of (i) Y on X

(ii) X on Y

(6 marks)

14 a) A box contains 3 white balls and 5 yellow balls. If three balls are drawn without replacement, determine the probability that:

- Exactly one yellow ball will be selected
- No white ball will be selected
- At least one yellow ball will be selected

(7 Marks)

b) Two policemen P and Q independently try to hit a target. The probability of

P hitting the target is  $\frac{1}{3}$  and that of Q is  $\frac{1}{4}$ . Establish the probability that:

- P alone hits the target (1 Mark)
- Q alone hits the target (1 Mark)
- Both policemen hit the target (1 Mark)

c) Compute the mean, mode, quartile deviation and standard deviation for the following data;

Marks	20-30	30-40	40-50	50-60	60-70	70-80
Number of students	5	20	12	10	8	5

(7 marks)

d) Find the mean deviation for the following set of scores;

20, 30, 60, 80 and 110

(3 marks)

- 15 a) Define the term measurement (2 Marks)
- b) Explain the following scales of measurements
- i. Nominal (4 Marks)
  - ii. Ordinal (4 Marks)
  - iii. Interval (4 Marks)
  - iv. Ratio (4 Marks)
- c) Explain any two properties of numbers manifested in the scales of measurements in (b) above (2 Marks)