

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE  
OF BACHELOR OF SCIENCE IN NATURAL RESOUC E MANAGEMENT

ENSC 261: STATISTICS FOR ENVIRONMENTAL SCIENCE

STREAMS: BSC (NARE) Y2S1

TIME: 2 HOURS

DAY/DATE: THURSDAY 05/12/2019

8.30 A.M. – 10.30 A.M.

INSTRUCTIONS:

- Answer ALL questions in section A and any TWO from section B
- Do not write anything on the question paper

SECTION A (30 MARKS)

- Briefly discuss any two levels of measurement [6 marks]
- The number of animals counted during a field event in a national park are given below

Type	Elephants	Lions	Hyenas	Warthogs	Zebras
Number	20	5	10	40	50

- Determine the percentage of each animals of the total [2 marks]
  - Determine the ratio of lions to warthogs [2 marks]
  - Determine the mode average for the data [2 marks]
- Performance in a given class was tabulated as shown in the table below. Determine the mean absolute deviation for the performance [6 marks]

Score	75	70	65	60
Frequency	10	20	25	15

**ENSC 261**

4. For the data given below

Age	30-39	40-49	50-59	60-69	70-79	80-89	90-99
f	50	71	88	55	36	13	3

- (a) Determine the mean [2 marks]
  - (b) Determine the standard deviation [4 marks]
  - (c) The standard scores for any two mid-values [2 marks]
5. List any four types of observations for descriptive studies [4 marks]

**SECTION B (40 MARKS)**

6. (a) Using an illustration, discuss the normal curve and its importance to statistics [10 marks]

(b) In testing a new nutritional supplement, athletes in one group are given the supplement and the other are given a placebo for one week and then a competition is held and time taken recorded. The treatment is repeated after one month with the treatments reversed. The results are presented below.

Participant	1	2	3	4	5	6	7	8	9	10
Supplement (sec)	62	44	57	47	44	52	60	72	55	75
Placebo (sec)	64	42	57	44	48	55	62	75	55	80

By use of Wilcoxon Matched-Pairs Signed-ranks test, determine whether the supplement affected the performance [10 marks]

7. (a) Students were asked to rate the perception of the knowledge gained after field visits to two places. The response are as given in the table below

	Field visit site	
Perception	Mwea national park	Mt. Kenya forest
High	18	10
Moderate	25	12
Low	8	15

By use of a test, test the association between the site visited and perception [10 marks]

**ENSC 261**

- (b) In testing a new sleep-including drug, participants in one group are given the drug and the other given a placebo. The time taken for them to sleep is recorded. The treatment is repeated after two weeks with the treatments reversed. The results are presented below

Participant	1	2	3	4	5	6	7	8
Drug (min)	10	12	8	11	7	15	12	8
Placebo (min)	15	18	10	12	10	12	16	13

By use of Paired t-test, determine whether the drug had any effect on the participants

[10

marks]

8. (a) Three species of antelopes were introduced into Lake Nakuru National Park. Their numbers were taken after every three months as shown below

Species 1	20	18	16	17	18	20	22	24		
Species 2	20	17	18	18	22	21	24	22	26	28
Species 3	20	20	17	16	17	15	13	13	10	

Using ANOVA, test the null hypothesis

[12 marks]

- (b) A pollution control device is applied in an industry. To determine whether its performance is affected by duration use, pollutant concentrations were taken for different durations of its use as shown below

Time of operation (hours)	4	6	10	13	15	16	12	8
Concentration (mg/l)	12	14	15	19	20	22	48	14

- (i) Determine the correlation coefficient (r) for the relationship [5 marks]  
 (ii) Test the significant of the relationship [3 marks]