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UNIVERSITY EXAMINATIONS 2013/2014
THIRD YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF EDUCATION (SCIENCE)

SZL 302: BIOSTATISTICS

Time: 2 Hrs

INSTRUCTIONS:

1. Answer ALL questions in section A (3 Marks each)

2. Answer any TWO questions in section B (20 Marks each)

3. Use illustrations where appropriate

SECTION A (30 Marks):

1. A student from JOOUST collected data on cancer patients attending a cancer clinic in Bondo District Hospital. He particularly collected data on patient's weight, marital status, cancer stages and the distance they travel to the clinic. Giving examples describe the different types of variables, which were collected by the student. (3marks)

2. To asses whether or not a newly developed pesticide called Bondoquine is carcinogenic, a researcher fed 30 mice daily with doses of Bondoquine and observed them weekly for 2 months. At end of the study, 10 of the mice developed tumuors.
   a) Describe the problem with this experimental set up and how it can be corrected (2marks)
   b) State how this type of study is called (1 mark)

3. List the advantages and disadvantages of diagrammatic representation of data (3 marks)

4. Compute the mean, median and the mode for the following data, 7, 8, 3, 14, 2, 1, 440, 15, 52, 62,11, 25, 12, 6, 9, 21, 6 7, 3 4, 70, 20, 200, 250, 21, 15, 10, 120, 8, 20, 20, 103. (3 marks)

5. Areas of sprayable surfaces with insecticide from a sample of 15 houses in m^2 are as follows:

   101,105,110,114,115,124,125, 125, 130,133,135,136,137,140,145
   a) Find the variance of the above distribution (2 marks)
   b) Calculate the standard deviation of the above distribution (1 mark)

6. Name any three important characteristics of normal distribution. (3 marks)

7. A researcher wants to study the prevalence of placental malaria among mothers attending antenatal clinic
   a. State the best sampling method the researcher should use giving merits and demerits of the sampling method. (2 marks)

b. If the total population of expectant women attending the antenatal clinic is 4000 and the researcher want to use a sample size of 250. Calculate the sample fraction. (1 mark).

8. An epidemiologist is worried about the ever-increasing trend of malaria in a certain locality and wants to estimate the proportion of persons infected in the peak malaria transmission period. If he takes a random sample of 150 persons in that locality during the peak transmission period and finds that 60 of them are positive for malaria, find

a) 95%

b) 90%

c) 99%

confidence intervals for the proportion of the whole infected people in that locality during the peak malaria transmission period. (3 marks)

9. List the assumptions of a two-tailed unpaired t test. (3 marks)

10. State the difference between correlation analysis and regression analysis. (3 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

11.

a) Discuss the Chi square (^{2}) test procedure describing its use, its characteristics and how to make inferences from its results. (10 marks)

b) In an experiment with peas, a person observed 360 round and yellow, 130 round and green, 118 wrinkled and yellow and 32 wrinkled and green. According to the Mendelian theory of heredity the numbers should be in the ratio 9:3:3:1. Is there any evidence of difference from the plants at 5% level of significance? (10 marks)

12. The data below shows the results obtained from a survey on whether resting metabolic rate is related to body weight.

Body Weight (kg)	RMR (kcal/24 hrs))
57.6 1325	1325
64.9 1365	1365
59.2 1342	1342
60.0 1316	1316
72.8 1382	1382
77.1 1439	1439
82.0 1536	1536
86.2 1466	1466
91.6 1519	1519
99.8	1639

a) Plot the above data using a scatter plot.   (4marks)
b) Using this data calculate the correlation coefficient.   (10marks)
c) Test the null hypothesis that there is no relationship between resting metabolic rate and body weight.   (6 marks)

13. The data below shows the total circulating albumin in gm for 30 normal males, aged 20-29 years

Circulating albumin in gm (Cl)	Frequency (f)	Class Boundaries	Mid-Point of a class interval	Cumulative frequency.	Relative cumulative frequency (%)
100-109	2				
110-119	6				
120-129	6				
130-139	7				
140-149	8				
150-159	1				

    a) Fill in the missing class boundaries, mid-points of the class interval, cumulative frequency and relative cumulative frequency (percentage) in the table above.   (6 marks)

    b) Calculate the mean, median and standard deviation of the above data.   (12 marks)

    c) State the merits and demerits of using such a table in representing data.   (4 marks)

14. A researcher is carrying out a study on how acute clinical *Plasmodium falciparum* malaria impacts on the immune system of children. The researchers then decide to collects data from children suffering from acute clinical malaria and compare them with healthy children without parasitemia at one time point.

    a) State how this type of study is called.   (2 marks)

    b) What is the purpose of collecting data from the healthy children?   (2 marks)

    c) List any three advantages and disadvantages of this type of study.   (3 marks)

    d) Discuss the different sampling technique that he would use.   (5 marks)

    e) State the hypothesis that he would use for this study.   (3 marks)

f) Based on this hypothesis, describe a statistical test that he would use.   (5 marks)