

**END OF 2ND TRIMESTER 2018 (FT) EXAMINATION**

**SCHOOL : SCIENCE AND TECHNOLOGY**

**DEPARTMENT : PURE AND APPLIED SCIENCES**

**UNIT CODE : MATH 231**

**UNIT TITLE : BIOSTATISTICS**

**TIME : 2 HOURS**

* **Instructions:** Answer Question ONE and any other TWO Questions.

**Question One (30 Marks)**

1. Differentiate between the following terms
2. Null and alternative hypotheses
3. Acceptance and rejection regions
4. Skewness and Kurtosis. (6marks)
5. Blood serum cholesterol levels of 10 people are listed below: 240, 260, 290, 245, 255, 288, 272, 263, 277, 250. Find the
6. Mean (3marks)
7. Standard deviation. (4marks)
8. Let x be a continuous variable that is normally distributed with a mean of 25 and a standard deviation of 4. Find the area between x =15 and x = 34. (4marks)
9. State the three limitations of statistics (3marks)
10. Find **four** conditions that must be satisfied by an experiment to be termed as a binomial experiment. (4marks)
11. The duration of time from first exposure to HIV infection to AIDs diagnosis is called the incubation period. The incubation periods of a random sample of 7 HIV infected individuals is given below (in year) 12.0, 9.5, 13.5, 7.2, 10.5, 6.3, 12.5.
12. Calculate the sample mean
13. Calculate the sample median
14. Calculate the sample standard deviation (6marks)

**Question Two (20 Marks)**

1. Find the mean , mode and median of the following distribution:- (9 Marks)

Marks 10-19 20-29 30-39 40-49 50-59 60-69 70-79 80-89 90-99

Frequency 3 7 12 18 22 17 14 9 5

(b) (i) The poisson distribution is used to computer the probability for the number of occurrences of a given event during a specific time period. State three conditions that must be satisfied for the poisson process to be applied. (3marks)

ii) The mean number of dogs infected with rabies per month in a certain town is 3. What is the probability that in any given moth 4 dogs will be infected with rabies. (3marks)

(c)A clinical officer carried out a research on the economic status and severity of respiratory illness on 8 people. The data below shows the ranks awarded.

|  |  |  |
| --- | --- | --- |
| Patient | Socio economic status | Severity of illness |
| A  B  C  D  E  F  G  H | 6  7  2  3  5  4  1  8 | 5  8  4  3  7  1  2  6 |

Calculate the spearman’s rank correlation coefficient and comment on the results of the research. (5marks)

**Question Three (20 Marks)**

1. State three advantages of the non-parametric tests over the parametric tests. (3marks)
2. A pharmaceutical company makes tranquilizers that are claimed to have a mean effective period of 2.8 hours. Researchers in a hospital used the drug on a random sample of 16 patients and found the mean effective period to be 2.5 hours with standard deviation of 0.4 hours. Does this indicate that the company's claim is too high? (use 0.05 level of significance). (5marks)
3. The food and drug administration (FDA) is examining the effects of different doses of a new drug on the pulse rate drop of human beings. The results of the study on six people is given below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Dose in mg (x) | 2.50 | 3.00 | 3.50 | 4.50 | 5.50 | 6.50 |
| Drop y | 8 | 11 | 9 | 16 | 19 | 20 |

1. Draw a scatter diagram for the data. (3marks)
2. Find the equations of the linear regression. (7marks)
3. If a dosage of 2.75mg in administered. What is the expected pulse rate drop. (2marks)

**Question Four (20 Marks)**

1. Define the term significance level. (2marks)
2. Differentiate the terms type I and type II errors. (4marks)
3. The personnel department of Meru Hospital is investigating the possible assessing the suitability of applicants by using psychological tests instead of normal interviewing procedures. A comparative test of seven applicants was carried out using both methods. Marks out of 10, for each applicant is as shown

|  |  |  |
| --- | --- | --- |
| Applicant | Interview procedure (x) | Psychological testing (y) |
| A  B  C  D  E  F  G | 4  1  7  6  2  3  5 | 5  2  7  4  1  3  6 |

1. Calculate Karl Pearson’s product moment correlation coefficient (r). (6marks)
2. Comment on the relationship between x and y. (2marks)
3. From the following set of data;

13, 9, 18, 15, 14, 21, 7, 10, 11, 20, 5, 18, 25, 16, 17,

Determine:

i) Quartiles (4 marks)

ii) Interquartile range (2 marks)