AMREF INTERNATIONAL UNIVERSITY
SCHOOL OF MEDICAL SCIENCE
DEPARTMENT OF REHABILITATION MEDICINE
BACHELOR OF SCIENCE IN PHYSIOTHERAPY
END OF MAY-AUGUST 2024 TRIMESTER EXAMINATIONS

UNIT CODE: PHT 315   UNIT NAME: BIOSTATISTICS (SPECIAL EXAM)

DATE: TUESDAY/ 13TH/ AUGUST
TIME: TWO HOURS
START: 11:15AM   STOP: 1:15PM

INSTRUCTIONS (physical exams)

1. **Do not write on this question paper**

(Marks and questions distribution as per program curriculum.)

INSTRUCTIONS (Online examinations)

1. This exam is marked out of 70 marks
2. This Examination comprises 3 Sections
3. This exam shall take 2 Hours

SECTION A: MULTIPPLE CHOICE QUESTION (20 MARKS)

1. The area under normal distribution curve is;

   A. 1
   B. 0.5
   C. 0
   D. None of these

2. The best way to display Age data is to draw;
   A. Histogram
   B. Bar chart
   C. Both a & b
   D. None of these

3. The square root of the mean of the square deviation about mean is known as:
   A. The variance
   B. Standard deviation
   C. Central value.
   D. The average value.

4. When p-value is less than α (level of significance) then we:
   A. Reject Oh
   B. Accept Oh
   C. None of these
   D. Reject AH

5. The probability of any event is defined as the number of the favorable events divided by the number of the sample space. Sample space is defined as:
   A. Even number of outcomes.
   B. Odd number of outcomes.
   C. All possible outcomes of an Experiment.
   D. None of all these.

6. Some characteristics are not capable of being measured in the sense that height, weight, and age are measured. These characteristics are categorized only, as for example, when an ill person is given a medical diagnosis, or a person is designated as belonging to an ethnic group. These variables are called:
   A. Qualitative (categorical) variables
   B. Random variable
   C. Quantitative variable
   D. Not possible.

7. The mean of the absolute deviation about mean is known as:
   A. variance
   B. Standard deviation.
   C. Mean deviation about mean.
   D. Mean.

8. Two events A and B are said to be mutually exclusive events if and only if:
    A. Both occur at a time.
    B. only one occurs
    C. Neither of them occurs
    D. none of them
9. In special rule of multiplication of probability, applies to the situation where?
    A. Independent events
    B. Mutually Exclusive events
    C. Two events both occur
    D. Empirical
10. The probability of any event is defined as the number of the favorable events divided by the sample space.
    A. The sum of the probabilities should be equal to one.
    B. The probability of any event lies between -1 and +1.
    C. The probability of any event can't be negative.
    D. The probability lies between 0 and 1.
11. The ANOVA method is used to test the equality of more than two population means at a time the test statistic is used in this method is known as:
    A. t-test
    B. chi-square test
    C. F-test
    D. z-test
12. In testing of hypothesis in order to test the equality of more than two population means at a time the method is used.
    A. Analysis of variance
    B. student t-test
    C. Chi-square test
    D. None of these
13. Random Sampling or Probability sampling includes all the following techniques, except:
    A. Simple random sampling
    B. Stratified random Sampling
    C. Cluster sampling
    D. Purposive Sampling
14. Gender, age-class, religion, type of disease, and blood group are measured on;
    A. Nominal Scale
    B. Ordinal Scale
    C. Interval Scale
    D. Ratio Scale
15. The Student t- test is most commonly applied when the test statistics would follow?
    A. Poisson distribution
    B. Normal distribution
    C. Binomial distribution
    D. All the distributions

16. The kruskal-wallis test used to compare?
    A. Two independent samples
    B. Two or more independent samples
    C. Two or three dependent samples
    D. Two dependent samples
17. The variable which is influenced by the intervention of the researcher is called:
    A. Independent
    B. Dependent
    C. Discrete
    D. Extraneous
18. The statistical approach which helps the investigator to decide whether the outcome of the study is a result of factors planned within design of the study or determined by chance is called:
    A. Descriptive statistics
    B. Inferential statistics
    C. Normal distribution
    D. Standard deviation
19. Which of the following methods is a form of graphical presentation of data?
    A. Line Diagram
    B. Pie diagram
    C. Bar diagram
    D. Histogram
20. Which of the following is not a condition of Poisson probability distribution?
    A. The mean and variance of the distribution are same (equal)
    B. The average number of success is known.
    C. The number of trials is always less than 5
    D. The probability of success is proportional to the size of the region

SECTION B –SHORT ANSWER QUESTIONS (30 MARKS) Answer all questions

21. From the following weight data: 67, 74, 53, 77, 59, 69, 54, 57, 71,69   (6 Marks)
   a) Find the mean and median   (3 marks)
   b) Calculate the variance and standard deviation   (3marks)
22. The pulse rate of 12 individuals were as follows: 72,88,74,78,84,90,80,84,80,86,88,86. Calculate.   (6 Marks)
   a) Q1 and Q3 and IQR   (3 marks)
   b) Construct a box plot   (3 marks)

23. The mean Medical Biostatics exam marks (X) has a bell-shaped distribution with a mean $\mu = 40$ and standard deviation $\sigma = 3$. Calculate the following   (6 Marks)
   a) $P(x < 50)$ (2 Marks)
   b) $P(x > 31)$ (2 Marks)
   c) $P(30 < x < 45)$ (2 Marks)

24. The mean survival age for 12 patients who have undergone kidney transplant is 60 years with a variance of 4 years. Estimate the 90% confidence interval for the population mean survival Age. Show all your workings. (6 Marks)

25. A manufacturer claims that its Infrared bulbs used in physiotherapy last an average of 1200 hours. A consumer group tests 30 bulbs and finds a mean lifetime of 1150 hours with a standard deviation of 100 hours. (6 Marks)

   a) State the null and alternative hypotheses.
   b) Conduct a hypothesis test at the 0.05 significance level.
   c) Calculate the p-value and interpret it.

SECTION C -LONG ANSWER QUESTIONS (20 MARKS)   Choose one question

26. Suppose the average weekly Covid-19 related death in Kenya is 4 out of 10 Covid-19 Patients reported. What is the probability that persons COVID-19 related deaths will be? (20 Marks)

   a) 5 on the next week   (8 Marks)
   b) At least 5 on the next week   (8 Marks)
   c) At most three on the next day   (4 marks)

27. Suppose we want to know whether or not three different nutritional diet lead to different mean weight on infants. To test this, we recruit 30 infants to participate in a study and split them into three groups. The infants in each group are randomly assigned to use one of the nutritional diet for the next three months. At the end of the three months, all of the infants' weights are taken.

   The weights for each group are shown below:

Group 1/Diet 1	Group 2/Diet 2	Group 3/Diet
8.5	9.1	7.9
8.6	9.2	7.8
8.8	9.3	8.8
7.5	8.5	9.4
7.8	8.7	9.2
9.4	8.4	8.5
9.8	8.2	8.3
7.9	8.8	8.5
7.1	9.5	8.2
8.0	9.6	8.1

   Use the following steps to perform a one-way ANOVA by hand to determine if the mean weight is different between the three groups/Diets: