



**AMREF INTERNATIONAL UNIVERSITY**  
**SCHOOL OF MEDICAL SCIENCES**  
**DEPARTMENT OF REHABILITATIVE MEDICINE**  
**BACHELOR OF SCIENCE IN PHYSIOTHERAPY**  
**END OF JAN-APRIL 2025 SEMESTER EXAMINATIONS**

**UNIT CODE: PHT 315**

**UNIT NAME: BIostatistics (Direct entry)**

**DATE: 8<sup>th</sup> April 2025**

**TIME: TWO HOURS**

**START: 9:00 AM                      STOP: 11:00AM**

**INSTRUCTIONS**

- 1. Attempt all questions as per the instructions in each section**
- 2. This exam is marked out of 70 marks**
- 3. This Examination comprises of Sections A, B and C**
- 4. It is the student's responsibility to report any page and number missing in this paper.**
- 5. Total number of pages are 7 including the cover page.**
- 6. Read through the instructions carefully before starting.**
- 7. Any aspect of cheating detected during and or after the exam administration will lead to nullification of your exam.**
- 8. Do not write on this question paper, use the provided booklet to write your answers**

## PAPER A

### SECTION A: MULTIPLE CHOICE QUESTION (30 MARKS)

- Which of the following is a categorical variable?
  - Age
  - Blood type
  - Height
  - Weight
- The nominal scale of measurement is used for:
  - Ranked data
  - Categorized data without a specific order
  - Data with meaningful zero points
  - None of the above
- A histogram is used to represent:
  - Categorical data
  - Numerical data
  - Both categorical and numerical data
  - None of the above
- What does a bar chart represent?
  - Frequency of categorical data
  - Measures of central tendency
  - Correlation between variables
  - Probability distributions
- The mean is a measure of:
  - Central tendency
  - Dispersion
  - Variability
  - Probability
- What is the coefficient of variation?
  - The ratio of standard deviation to mean
  - The difference between mode and median
  - A measure of probability
  - A type of correlation
- A positively skewed distribution has:
  - A tail on the left side
  - A tail on the right side
  - No tails
  - Equal tails on both sides
- Which probability distribution is used for a sample mean distribution?
  - Binomial distribution
  - Poisson distribution
  - Normal distribution

- D. Exponential distribution
9. The probability of independent events occurring together is calculated by:
- A. Addition rule
  - B. Multiplication rule
  - C. Division rule
  - D. Subtraction rule
10. Which of the following is an example of a ratio scale measurement?
- A. Temperature in Celsius
  - B. Height in centimeters
  - C. Blood type
  - D. Education level
11. The area under normal distribution curve is;
- A. 1
  - B. 0.5
  - C. 0
  - D. None of these
12. The best way to display Age data is to draw;
- A. Histogram
  - B. Bar chart
  - C. Both a & b
  - D. None of these
13. 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.
14. When p-value is less than  $\alpha$  (level of significance) then we:
- A. Reject  $H_0$
  - B. Accept  $H_0$
  - C. None of these
  - D. Reject  $H_1$
15. 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.
16. 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.

17. The mean of the absolute deviation about mean is known as:
- A. variance
  - B. Standard deviation.
  - C. Mean deviation about mean.
  - D. Mean.
18. 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
19. 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
20. 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.
21. 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
22. 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
23. 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
24. 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
25. 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
26. 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
27. The variable which is influenced by the intervention of the researcher is called:
- A. Independent
  - B. Dependent
  - C. Discrete
  - D. Extraneous
28. 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
29. Which of the following methods is a form of graphical presentation of data?
- A. Line Diagram
  - B. Pie diagram
  - C. Bar diagram
  - D. Histogram
30. 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 (20 MARKS) Answer all questions**

1. From the following weight data: 77, 84, 63, 87, 69, 79, 64, 67, 81,79 (5Marks)
  - a) Find the mean and median (2 marks)
  - b) Calculate the variance and standard deviation (3marks)
2. The pulse rate of 8 individuals were as follows: 82,98,84,88,94,90,94,80,calculate. (5 Marks)
  - a) Q1 and Q3 and IQR (2 marks)
  - b) Construct a box plot (3 marks)
3. The mean Medical Biostatistics exam marks (X) has a bell-shaped distribution with a mean  $\mu = 40$  and standard deviation  $\sigma = 3$ . Calculate the following (5Marks)
  - a)  $P(x < 50)$  (1 Marks)
  - b)  $P(x > 31)$  (2 Marks)
  - c)  $P(30 < x < 45)$  (2 Marks)

4. 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. (5 Marks)

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

1. 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)

2. The following were the weights of 16 patients attending a Hypertension clinic. (20 Marks)

104, 131, 127, 109, 121, 140, 126, 136, 140, 122, 124, 123, 128, 114, 99, 130. For the data above, group the systolic BP in a class width of 10 and construct a frequency table (5 Marks)

- a) Calculate the relative frequency and cumulative frequency (6 Marks)
- b) Compute the mean, median and mode (9 Marks)



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