



BRAINWARE UNIVERSITY

Term End Examination 2024-2025

Programme – B.Sc.(BT)-Hons-2022

Course Name – Biostatistics

Course Code - BBTD504A

(Semester V)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) The data on income levels (high, medium, low) of 50 people is described as
 - a) Nominal data
 - b) Discrete data
 - c) Ordinal data
 - d) None of these
- (ii) A data on colours of 5 flowers (viz. green, green, pink, white, red and orange) is identified as
 - a) Nominal data
 - b) Frequency data
 - c) Non-frequency data
 - d) Ordinal data
- (iii) The name of the method of collection of data on every individual of the source is
 - a) Sample survey
 - b) Census
 - c) Pilot survey
 - d) None of these
- (iv) A good measure of central tendency is described as
 - a) affected by extreme values
 - b) does not consider extreme values
 - c) is 0 for extreme values
 - d) not affected by extreme values
- (v) Among A.M., median and mode, the robust measure is identified as
 - a) A.M.
 - b) Median
 - c) Mode
 - d) None of these
- (vi) The coefficient of variation of a data with A.M. 30 and S.D. 5 is approximately calculated as
 - a) 20%
 - b) 16.67%
 - c) 14.5%
 - d) 35.2%
- (vii) The quartile deviation of the data 11,12, 14, 17, 20 is computed as
 - a) 2.6
 - b) 3.5
 - c) 2.7
 - d) 3
- (viii) A distribution with mean=median=mode is interpreted as
 - a) positively skewed
 - b) symmetric
 - c) negatively skewed
 - d) none of these
- (ix) A moderately skewed distribution with mean = 3.4, median = 1.3 and s.d.=0.9, the coefficient of skewness is computed as
 - a) 6
 - b) 7
 - c) 8
 - d) 9
- (x) The lower class boundary of a class boundary 36.5-40.5 is identified as

- a) 35
c) 35.5
- (xi) Select the correct option for Bayes' Theorem.
a) $P(A|B) = P(B|A)P(A)P(B|A)P(B)$
c) $P(A|B) = P(B|A)P(A)$
- (xii) A random experiment is described as
a) a statistical experiment whose outcomes are known but cannot be predicted beforehand.
c) an experiment that cannot be repeated further.
- (xiii) Let $E(T)=\theta=E(S)$, where T, S are linear functions of the sample observations. If $\text{Var}(T) < \text{Var}(S)$, then identify correct option.
a) T is an unbiased linear estimator
c) T is a consistent linear unbiased estimator.
- (xiv) 'Chi Square test' is used to measure the _____. Select correct option.
a) Mean Deviation
c) Trend
- (xv) For a treatment A, it is found that $\text{MSA}=25$ and degrees of freedom = 2, then compute the Sum of squares of treatment A.
a) 12.5
c) 25
- b) 36
d) 36.5
- b) $P(A|B) = P(A)P(B)/P(A \cap B)$
d) $P(A|B) = P(B|A)P(A)/P(B)$
- b) an experiment whose outcomes can be predicted beforehand.
d) None of these.
- b) T is BLUE
d) T is consistent best linear unbiased estimator.
- b) Goodness of Fit
d) Variation
- b) 50
d) 100

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Write a short note on scatterplot with example. (3)
3. Define regression coefficients b_{YX} and b_{XY} . Show that $b_{YX} \times b_{XY} = r^2$ where r is the Pearson's correlation coefficient. (3)
4. Compute the frequency densities in the following frequency distribution of a continuous variable. (3)
- | Class Boundary | Frequency | Frequency density |
|----------------|-----------|-------------------|
| 100 - 120 | 30 | |
| 120 - 150 | 25 | |
| 150 - 190 | 44 | |
| 190 - 230 | 23 | |
| 230 - 260 | 37 | |
| 260 - 300 | 18 | |
5. Discuss measure of dispersion and any two measures of dispersion. (3)
6. For a binomial distribution $\text{Bin}(10, 0.6)$, calculate (i) $E(X)$, (ii) $E(X^2)$, (iii) $\text{Var}(X)$. (3)

OR

For a normal distribution $N(0, 3)$, calculate (i) $E(X)$, (ii) $E(X^2)$, (iii) $\text{Var}(X)$. (3)

7. Suppose $X \sim P(2)$. Calculate the measure of kurtosis of β_2 . Also calculate γ_2 and comment on the nature of its kurtosis. (5)
8. Suppose $X \sim P(3)$ distribution. Calculate (i) $P(X = 3)$, (ii) $P(X < 3)$, (iii) $P(X > 3)$. (5)
9. There are three urns having the following composition of black and white balls. (5)

Urn-I	7 white balls	3 black balls
Urn-II	4 white balls	6 black balls
Urn-III	2 white balls	8 black balls

One of these urns is chosen at random with probabilities 0.2, 0.6 and 0.2 respectively. From the chosen urn two balls are drawn at random without replacement. Calculate the probability that both the balls are white.

10. Explain chi-square goodness of fit test in brief. (5)
11. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal, are same against that they are not, at 5% level of significance. (Given that $Z_{0.025} = 1.96$.) (5)
12. A random sample of size $n(> 100)$ is drawn from a population having $N(\mu, \sigma^2)$ distribution, say y_1, \dots, y_n ($\sigma > 0$). Construct a 95% confidence interval for μ for testing $H_0 : \mu = 15$ against $H_1 : \mu \neq 15$. (Given that $Z_{0.975} = 1.96$.) (5)

OR

A random sample of size 20, i.e. x_1, \dots, x_{20} is obtained from a population following a $Bin(7, p)$ distribution. Determine the critical region for testing $H_0 : p = 0.4$ against $H_1 : p < 0.4$ at level of significance $\alpha = 0.05$. (Given that $Z_{0.05} = -1.645$.) (5)
