# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE- SEMESTER–V (NEW) EXAMINATION – WINTER 2024

**Subject Code:3150409**                                                 **Date:25-11-2024**
**Subject Name:Biostatistics**
**Time:10:30 AM TO 01:00 PM**                              **Total Marks:70**
**Instructions:**
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

|  |  |  | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | Find the median for the following data:<br>Income (in Rs.): 100  150  80  200  250  180<br>No. of persons:  24  26  16  20  6  30<br>Consider each value of Income to be corresponding with No. of persons. | **03** |
|  | **(b)** | Explain each with their types with necessary diagram: i) Skewness, ii) Kurtosis | **04** |
|  | **(c)** | There are two identical boxes named as R and W. Box R contains 4 red and 2 white coloured balls. Box W contains 5 red and 3 white coloured balls. A ball is chosen randomly and taken out of box. If the ball is white what is the probability that it has been drawn from box W? Also find the probability, if the ball chosen is red and drawn from box R. | **07** |
| **Q.2** | **(a)** | Write the following in the form of sets and draw a Venn diagram- A= BIOSTATISTICS; B= MATHEMATICS. | **03** |
|  | **(b)** | Differentiate: Histogram and Frequency Polygon | **04** |
|  | **(c)** | Calculate the standard deviation, variance and coefficient of variance of the following data (using assumed mean method):<br>Height (inches)  No. of Children<br>  95-105        19<br>105-115        23<br>115-125        36<br>125-135        70<br>135-145        52 | **07** |

**OR**

|  |  |  |  |
|---|---|---|---|
|  | **(c)** | Calculate the standard deviation for the following distribution:<br>Profits (Rs.)  No. of company<br> 20-30        30<br> 30-40        58<br> 40-50        62<br> 50-60        85<br> 60-70       112<br> 70-80        70<br> 80-90        57<br> 90-100      26 | **07** |
| **Q.3** | **(a)** | To address some of the calculations, which type of central tendency would be appropriate for the each of the following 3 cases (Answer from one of the- Mean/Median/Mode): | **03** |

i) Size of the shoes sold at a shop
ii) Comparison of intelligence of students
iii) Per capita income in several countries

**(b)** The coefficient of rank correlation between marks in Biostatistics and Bioinformatics obtained by students of Harvard College is 2/3. The sum of square of the differences in ranks is 55. Find the number of students in the group. **04**

**(c)** Find mean of the variables X and Y and the correlation coefficient from the following regression equations: **07**
2Y-X=50 & 3Y-2X=10.

**OR**

**Q.3** **(a)** Answer the following whether it has positive/negative or no correlation: **03**
i) Global warming and pollutants
ii) IQ level and score obtained in an exam
iii) Clouds in the sky and sunlight intensity on land

**(b)** The correlation coefficient between X and Y is 0.60. If the variance of x=225, the variance of y= 400, mean of x=10 and mean of y=20, find the equation of the regression lines of i) Y on X and ii) X on Y. **04**

**(c)** Calculate Pearson's correlation coefficient for the following data on marks obtained by 10 students of 2 different batches for the subject of accounts: **07**

| Group-A | Group-B |
|---------|---------|
| 45 | 35 |
| 70 | 90 |
| 65 | 70 |
| 30 | 40 |
| 90 | 95 |
| 40 | 40 |
| 50 | 60 |
| 75 | 80 |
| 85 | 80 |
| 60 | 50 |

**Q.4** **(a)** Calculate the arithmetic, harmonic and geometric mean for the data points: 2, 6, 12. **03**

**(b)** Explain the following non parametric tests with their application: **04**
i) Mann-Whitney U-test
ii) Kruskal-Wallis test
iii) Kolmogorov-Smirnov test

**(c)** In a test given to two groups of students (A & B) drawn from south point school, the marks obtained are as follows: **07**

| Group A | Group B |
|---------|---------|
| 46 | 18 |
| 44 | 36 |
| 30 | 20 |
| 35 | 49 |
| 26 | 50 |
| 28 | 34 |
| 29 | 49 |
| -- | 36 |
| -- | 41 |

Examine at 5% level whether the two groups of school students have the same variance or not. ($F_{0.05(8,6)} = 4.15$)

**OR**

**Q.4** **(a)** Calculate the median for the data points: 21, 12, 49, 37, 88, 46, 55, 74, 63. **03**
**(b)** Explain non-parametric tests with its features, merits and demerits. **04**

| | (c) | Applications of fertilizers were tested for the yield of rice grown in 10 plots. Another seed of 10 plots of similar size and condition were taken as control. Test the effect of fertilizer. | **07** |
|---|---|---|---|

Plot No.   Fertilizer applied   Fertilizer not applied

| Plot No. | Fertilizer applied | Fertilizer not applied |
|---|---|---|
| 1 | 16 | 10 |
| 2 | 14 | 12 |
| 3 | 18 | 11 |
| 4 | 15 | 9 |
| 5 | 13 | 13 |
| 6 | 17 | 13 |
| 7 | 16 | 12 |
| 8 | 15 | 14 |
| 9 | 14 | 13 |
| 10 | 13 | 11 |

$T_{(0.05, 18)} = 2.10$

**Q.5** **(a)** Define standard error of mean and state its formula to calculate. **03**

**(b)** Find A U B, A ∩ B, A' and B' if U= set of alphabets of word UNITED STATES OF AMERICA, A= set of alphabets of word INDIA, B= set of alphabets of word CANADA. **04**

**(c)** Mendel self-fertilised pea plants with round and yellow peas. In the next generation (F2) he recovered the following number of peas: **07**

315 round and yellow peas,

108 round and green peas,

101 wrinkled and yellow peas,

32 wrinkled and green peas.

What is your hypothesis about the genetic control of the phenotype? Does the data support this hypothesis if the critical value at 0.05 level is 7.82 for degrees of freedom= 3?

**OR**

**Q.5** **(a)** Define: Quartiles, Deciles and Percentiles **03**

**(b)** The mean length of 500 and 600 screws are 186 and 175 mm respectively. The corresponding standard deviations are 9 and 10 respectively. The length variabilities are studied. Find the combined mean and variance of the combined sample. **04**

**(c)** Workout one-way ANOVA to find whether the significant difference between the wing lengths (mm) of the following two groups of grasshoppers from two different habitats of Ahmedabad. $F_{0.05(1,18)} = 4.41$ **07**

| Group A | Group B |
|---|---|
| 5.0 | 2.8 |
| 4.0 | 3.7 |
| 3.8 | 3.1 |
| 4.3 | 2.2 |
| 4.5 | 4.5 |
| 5.3 | 3.0 |
| 2.8 | 4.6 |
| 4.6 | 3.0 |
| 5.1 | 2.4 |
| 4.6 | 4.7 |

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