Seat No./Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

POST GRADUATE DIPLOMA IN BIOINFORMATICS (DB) - SEMESTER - 1 EXAMINATION - WINTER - 2024

Subject Code:1310105 **Date: 31 Dec 2024**

Subject Name: Statistics

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. **Draw neat and clean diagrams as required.**

Q.1 **Write a note on following** **(Marks-10X2=20)**

1. What are the methods of random sampling?

2. What is ogive? Give its example.

3. What is RCBD?

4. What test is conducted on the population with normal distribution?

5. Types of error in testing hypothesis.

6. In cricket, a Man of the Match (MoM) award is given to the outstanding player in a match. Table 1 shows the most MoM awards won by a team of 11 players, each of whom played all matches for which the dataset is given.

Players	MoM awards (frequency)	Relative frequency
Player 10		
Player 3	58	
Player 4	57	
Player 7		0.114
Player 2	19	0.038
Player 9	43	
Player 1	42	
Player 11	41	
Player 6	41	
Player 5	41	
Player 8	25	

Q1. How many MoM awards did players 7 and 10 wins?
Q2. What is the mean and mode of MoM?

7. What is poission distribution, and when is it used?

8. What is the law of large numbers?

9. Calculate the mean deviation and its coefficient from the following data
Variable= 40, 70, 20, 50,30, 60,80

10. Write down the differences between the Z-test and the t-test.

Q.2 **Answer the following (Any 2 out of 3)** **(Marks-2X10=20)**

1. Researchers have shown that regular intake of cow milk increases the height of growing children. Data on one of the experiments is given below

Volume of milk drank by baby daily (ml)	Increase in baby's height since birth (cm)
240	7
380	10
300	8
275	7
350	9
320	9
270	7
370	10
360	9
300	8

Calculate the regression coefficient (b) and its test of significance.

2. Using a suitable test, determine whether Levodopa administration has increased the climbing capacity of Drosophila. Also, find out the central tendency and variability of data.

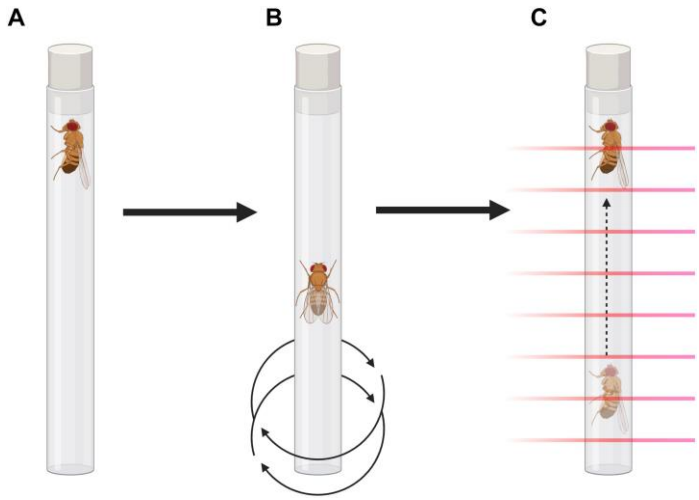

Figure: Drosophila climbing test after Levodopa administration

Pre-treatment climbing (cm)	Post-treatment climbing (cm)
12	15
14	18
13	19
11	18
12	14
10	15
15	19
13	13
9	12
14	16

Table: Climbing test reading of Drosophila before and after Levodopa administration

3. What is probability distribution, and how many types of probability distributions exist? Briefly describe the basic properties and uses of these distributions.

Q.3 **Answer the following (Any 6 out of 8)** **(Marks-6X5=30)**

1. Differentiate between pearson's and spearman's correlation and describe the concept of the correlation coefficient.

2. Describe the concept of longitudinal study and its application with an example

3. A study is designed to test whether there is a difference in mean daily calcium intake in adults with normal bone density, adults with osteopenia (a low bone density that may lead to osteoporosis) and adults with osteoporosis. Adults 60 years of age with normal bone density, osteopenia and osteoporosis are randomly selected from hospital records and invited to participate in the study. Each participant's daily calcium intake is measured based on reported food intake and supplements. The data are shown below.

Normal Bone Density	Osteopenia	Osteoporosis
1000	1100	900
1200	1000	750
950	750	1000
950	850	950
750	500	450
800	600	300

Is there a statistically significant difference in mean calcium intake in patients with normal bone density compared to patients with osteopenia and osteoporosis?

4. Calculate the correlation coefficient between marks obtained by a set of ten students in their class 10^{th} (X) and class 12^{th} (Y) exams as given in Table

X	365	476	540	596	439	399	545	350	420	505
Y	290	350	412	450	300	335	450	450	375	390

5. A family is going to have 4 children. Find the probability for each of the following event

1) The family has precisely 2 male children

2) The family has at most 2 children

6. In a hospital, 300 cases of typhoid fever were admitted at any point in time, 150 patients were given chloramphenicol, and 150 were given ciprofloxacin. Find whether the difference is significant or not using chi-square test

Drug	Cured	Not cured	Total
ciprofloxacin	143	7	150
Chloramphenicol.	137	13	150
Total	280	20	300

7. Describe various types of methods for the graphical representation of data.

8. What are the basic principles of experimental design? Explain Briefly.

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