Registration Number:

Date & Session:

**ST JOSEPH’S UNIVERSITY, BENGALURU -27**

**M.Sc. Biotechnology- II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2024**

**(Examination conducted in May/June 2024)**

**BT 8422: BIOSTATISTICS**

**(For current batch students only)**

**Time: 2 hours Max Marks: 50**

**This paper contains THREE printed pages and THREE parts**

**PART-A**

**Answer any SEVEN of the following 2m x 7 = 14 marks**

1. Why is an arithmetic average considered better than positional average?
2. Why do we convert absolute measure to relative measures of dispersion?
3. What does regression study? Why is it important?
4. What are the assumptions of Binomial distribution?
5. When do we accept the null hypothesis in a 𝛘2 distribution? Why?
6. What are 1 tailed tests? Give an example of an alternate hypothesis for a 1-tailed test.
7. When do we perform ANOVA? Which components of the table are additive?
8. What are post-ANOVA tests? When do we perform them?
9. What are the advantages and disadvantages of LSD?

**PART B**

**Answer any FOUR of the following: 5m x 4 = 20 marks**

1. Calculate the mean from the following data:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
| f | 15 | 20 | 25 | 27 | 30 | 20 | 15 | 12 | 10 | 11 |

1. Calculate the coefficient of variation from the following data on the number of fruits per plant, and state which variety is more consistent?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variety A | 20 | 22 | 19 | 23 | 16 |
| Variety B | 10 | 20 | 18 | 12 | 15 |

Var A : s=2.45 Var B: s=3.69

1. The data on nitrate content in two lakes is given below. Test whether there is any statistical difference? (tab value = 2.88)

|  |  |  |  |
| --- | --- | --- | --- |
|  | n | mean | variance |
| Lake 1 | 10 | 0.98 | 0.92 |
| Lake 2 | 10 | 1.39 | 0.96 |

1. Calculate the correlation coefficient from the following data on heights in inches, of fathers (x) and sons (y), and comment.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 65 | 66 | 67 | 68 | 67 | 69 | 70 | 64 | 65 | 63 |
| y | 68 | 65 | 68 | 70 | 67 | 68 | 72 | 66 | 68 | 62 |

Σx=664 Σy=674 Σx2=44134 Σy2= 45494 Σxy=44797

1. The chloride content of water was measured at three different stations of a lake. The seasonal averages of chloride in mg/l were recorded. A 2-way ANOVA has to be conducted.

State the null and alternate hypotheses. From the following data, construct the ANOVA table and conclude if there are seasonal variations and/or variations attributed to the stations.

CF=336361.33, Σx2= 368951.71, Σ(stations)2/seasons =343286.1, Σ(season)2/stations = 355255.72 [tab value- Stations- 6.94, seasons-6.94]

1. Data recorded on the number of tillers per plant of a wheat variety in M2 mutagen (DES) treated material is given below. Calculate the LSD and draw your conclusion on the mean differences in the number of tillers per plant.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Replication | 0 | 0.1% | 0.2% | 0.3% |
| 1 | 12 | 14 | 18 | 21 |
| 2 | 10 | 15 | 17 | 14 |
| 3 | 16 | 12 | 21 | 12 |
| 4 | 16 | 18 | 21 | 15 |
| 5 | 12 | 16 | 17 | 13 |
| Total | 66 | 75 | 94 | 75 |

TrMSS= 27.8, EMSS= 7.23, t(0.05)= 2.12, t(0.01)= 2.92

**PART C**

**Answer any TWO of the following: 8m x 2 = 16 marks**

1. From past recordings, the average number of industrial accidents per year is 4. Find the probability that in a given year there will be less than 4 accidents.
2. On the basis of information given below about the treatment of 200 patients suffering from a disease, state whether the new treatment is comparatively superior to the conventional treatment. (tab value = 3.84)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Favorable | Not favorable | Total |
| New | 60 | 30 | 90 |
| Conventional | 40 | 70 | 110 |
| Total | 100 | 100 | 200 |

1. The following data on ages of managers in four firms is given below. Test whether there is any difference. (tab value= 5.3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | A | B | C | D |
| 1 | 50 | 50 | 55 | 50 |
| 2 | 56 | 53 | 52 | 45 |
| 3 | 55 | 45 | 49 | 50 |
| 4 | 57 | 50 | 52 | 41 |
| 5 | 52 | 50 | 50 | 45 |
| Total | 270 | 248 | 260 | 231 |