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**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**B.Sc. BIOTECHNOLOGY– VI SEMESTER**

**SEMESTER EXAMINATION: APRIL 2017**

**BT 6212 : Biostatistics and Plant Biotechnology**

Time- 3 hrs Max Marks-100

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

1. **Answer any FIFTEEN of the following 15 X 3 =45**
2. What are the ‘Green revolution genes’?
3. What is somatic embryogenesis?
4. Discuss the choice of genomic library versus cDNA library for gene cloning in transformation experiments.
5. What are selectable markers? Give examples.
6. Name and briefly describe any three direct methods of plant transformation.
7. What are the reasons for increased pest and insect damage in crop plants?
8. Describe the structure of the Ti plasmid. What is ‘disarming’ of the Ti plasmid?
9. What are edible vaccines?
10. Differentiate between relative and absolute measures with suitable examples.
11. State the characteristics of a good measure of central tendency.
12. Calculate the range and its coefficient from the following data.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Age at last birthday** | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 |
| **Number** | 4 | 20 | 38 | 24 | 10 | 9 |

1. What is random sampling? Explain stratified sampling.
2. Depict the following using a suitable graph.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Income** | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| **Persons** | 8 | 14 | 19 | 17 | 12 |

1. State multiplication rule of probability. When would conditional probability be used?
2. What are errors? State the types and measures taken to minimize them.
3. What are the assumptions of Binomial distributions?
4. What is regression? State the quantities represented by a) the slope and b) the Y intercept on a regression line.
5. **Answer any FIVE of the following 5 X 5 =25**
6. Describe with examples, molecular farming of commercially important products in plant hosts.
7. What is Marker Assisted Selection? What are the advantages of using MAS over conventional breeding techniques?
8. How do abiotic stresses affect crop productivity? What are the ways of engineering abiotic stress tolerance in crop plants?
9. In your opinion, do GM crops support sustainable farming? State you case using recent statistics.
10. Locate the value of Mode graphically from the following distribution

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Plant fresh weight (g)** | 100-110 | 110-120 | 120-130 | 130-140 | 140-150 |
| **No of plants** | 100 | 114 | 124 | 117 | 113 |

1. Calculate the coefficient of variance from the following sets of data. Infer which one has a higher variation.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Set 1** | 6 | 5 | 8 | 6 | 4 | 4 | 5 | 3 | 4 |
| **Set 2** | 8 | 9 | 10 | 3 | 2 | 9 | 6 | 3 | 2 |

1. The output of a manufacturing firm is 20% defective. What is the probability of getting 4 defective ones in a sample of 10?
2. **Answer the following 3 X 10 =30**
3. With examples, describe the various approaches to engineer herbicide tolerance in crop plants.

**OR**

1. What is Bollgard cotton? What are the transgene/transgenes that have been used to generate Bollgard cotton? What is the mode of action of these genes? Comment on the merits and demerits of the Bollgard cotton crop in India.
2. The table given below shows the data obtained during the epidemic of cholera. Test the effectiveness of vaccination in preventing the susceptibility of attack of cholera.

|  |  |  |
| --- | --- | --- |
|  | **Attacked** | **Not Attacked** |
| **Vaccinated** | 24 | 32 |
| **Not Vaccinated** | 50 | 14 |

**OR**

1. In order to test the effect of a fertilizer, wheat was grown in 12 plots with fertilizer. Control plots did not have fertilizer. Test the significance of fertilizer on yield.

|  |  |  |  |
| --- | --- | --- | --- |
| **Fertilizer Applied** | | **Control** | |
| **Plots** | **Yield** | **Plots** | **Yield** |
| 1 | 15.6 | 1 | 13.0 |
| 2 | 13.3 | 2 | 13.1 |
| 3 | 19.5 | 3 | 18.0 |
| 4 | 19.5 | 4 | 16.2 |
| 5 | 17.0 | 5 | 16.2 |
| 6 | 17.7 | 6 | 12.8 |
| 7 | 15.9 | 7 | 15.0 |
| 8 | 18.4 | 8 | 14.9 |
| 9 | 17.5 | 9 | 16.4 |
| 10 | 14.8 | 10 | 14.0 |
| 11 | 17.3 | 11 | 16.1 |
| 12 | 18.0 | 12 | 16.2 |

1. Dry seed material of sorghum was treated with 0.25% of KCl for 6 hours. Data were recorded on the root length (cm) and shoot length (cm) on the 10th day. Results recorded on seeding parameters are given below. Calculate the correlation coefficient and test its significance.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Root length (cm)** | 11.6 | 8.5 | 3.5 | 12.6 | 6.8 | 7.7 | 13.0 | 9.6 | 10.2 | 11.2 |
| **Shoot length (cm)** | 9.2 | 6.3 | 2.9 | 10.6 | 5.9 | 5.1 | 13.3 | 7.6 | 8.7 | 10.6 |

**OR**

1. Data pertaining to the number of pods of a random sample of 100 plants from a population of *Cajanus cajan* are given below. Calculate the Karl Pearson’s coefficient of skewness.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No of Pods** | 130-134 | 135-139 | 140-144 | 145-149 | 150-154 | 155-159 | 160-164 |
| **No of Plants** | 3 | 12 | 21 | 28 | 19 | 12 | 5 |