**Time: 3 Hours**                                              **Marks: 100**

**Instructions:**
1. **All questions are compulsory.**
2. **Figures to the right indicate full marks.**
3. **Draw neat labelled diagrams wherever necessary.**
4. **Use of a simple, non-programmable calculator is allowed.**

**Q1. Answer any TWO of the following:**                      **(20)**
A) What are Carbohydrates? Explain the structure of different aldose sugars studied by you.
B) Define Proteins and describe their general structure. How are they classified?
C) Compare and contrast the mechanisms of competitive and non-competitive inhibition in enzyme kinetics.
D) What are enzymes? Classify them according to IUB classification citing suitable examples.

**Q2. Answer any TWO of the following:**                      **(20)**
A) Describe the structure and activity of Nitrogenase enzyme complex.
B) Explain in detail the steps involved in the formation of root nodules.
C) Write a note on the commercial applications & physiological effects of Cytokinins as growth regulators.
D) Explain the role of Abscisic acid as a growth regulator.

**Q3. Answer any TWO of the following:**                      **(20)**
A) What are point mutations? Explain missense and nonsense mutations with examples.
B) What are mutagens? Explain the role 5BU as a mutagen.
C) Explain the molecular basis of PKU?
D) Draw the map of three genes (sc s and v) showing the distance between all pairs of genes by finding out the correct gene order.

| sc | s | v | 314 |
|----|----|----|-----|
| + | + | + | 280 |
| + | s | v | 150 |
| sc | + | + | 156 |
| sc | + | v | 46 |
| + | s | + | 30 |
| sc | s | + | 10 |
| + | + | v | 14 |

**Q4. Answer any TWO of the following:**                      **(20)**
A) Three varieties of wheat were sown in 4 plots each and the following yields in quintal per acre were obtained. Analyze with **ANOVA** whether the three varieties differ in yields or not.

| A | B | C |
|---|---|---|
| 8 | 7 | 2 |
| 4 | 5 | 5 |
| 6 | 5 | 4 |
| 7 | 3 | 4 |

(Tabulated F at 5% = 4.26)

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B) Number of seeds (x) and length of pod (y) are given below. Calculate the **regression coefficient b.**

| x | 1 | 1 | 2 | 5 | 4 | 6 | 3 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| y | 2.0 | 1.5 | 2.0 | 4.5 | 5.0 | 7.0 | 4.0 | 3.0 | 3.0 | 4.5 |

C) Albino rats were given a drug for 7 days. Their body weight was measured before and after exposure to the drug. Analyse whether the drug has any effect on body weight with the help of **paired t – test.**

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Before | 110 | 115 | 102 | 98 | 112 | 110 | 97 | 120 | 102 | 110 |
| After | 109 | 116 | 100 | 95 | 108 | 112 | 98 | 115 | 98 | 111 |

(Tabulated t at 5%= 2.26)

D) In order to find effect of *Azolla* growth on rice yield, *Azolla* was grown in ten plots before rice planting. Ten similar plots were taken as control without *Azolla* growth. The yield of rice is given in the table. Verify with **unpaired t –test** whether there is effect of *Azolla* growth on rice yield.

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| With | 15.3 | 15.8 | 16.1 | 17.0 | 15.5 | 16.5 | 16.2 | 15.5 | 17.1 | 16.3 |
| Without | 14.5 | 13.8 | 15.9 | 13.9 | 14.8 | 14.9 | 15.2 | 15.0 | 14.1 | 13.7 |
|  |  |  |  |  |  |  |  |  |  |  |

(Tabulated t at 5% = 2.10)

**Q5. Write short notes on any FOUR of the following:** (20)

    a) Km
    b) Saturated fatty acids
    c) Denitrification
    d) Commercial applications of Auxins
    e) Incomplete linkage
    f) UV light as a mutagen
    g) Degree of freedom in ANOVA
    h) Applications of t – test

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