

(3 Hour)

[Total Marks: 100]

N.B.:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat labelled diagrams wherever necessary.
- 4) Use of log tables and non-programmable calculators is allowed.

Q.1 Attempt ANY TWO of the following: 20

- A. Explain the chemical structures of amylose and amylopectin.
- B. What are enzymes? Classify them according to IUB classification with examples
- C. What are fatty acids? Give a concise account of the structure of different fatty acids.
- D. Describe the action of enzymes with the help of Michaelis - Menten's equation

Q.2 Attempt ANY TWO of the following: 20

- A. Explain in detail the steps involved in the formation of root nodules.
- B. Describe the mechanism of ammonia assimilation in plants.
- C. Describe the Physiological effects and commercial applications of Gibberellins.
- D. Write in detail the physiological effect and commercial applications of Abscisic acid.

Q.3 Attempt ANY TWO of the following: 20

- A. What are molecular mutations? Explain missense and nonsense mutations with examples.
- B. What are mutagens? Explain the role of radiations as mutagens.
- C. Explain the molecular basis and effects of PKU.
- D. Following are the results of a three-point test cross. Calculate cross over percentage and draw a chromosome map for the genes A, B, and C:

ABC – 71	aBC – 18
abc – 64	AbC – 14
abC – 2	Abc – 17
aBc – 11	ABc – 3

Q.4 Attempt ANY TWO of the following: 20

- A. Calculate regression coefficients b_{xy} and b_{yx} for the following data:

X	1	3	5	7	9
Y	2	4	6	8	10

B. The mean life of a sample of 10 bulbs used in a Plant tissue culture laboratory A1 was found to be 1456 hours with a standard deviation of 423 hours. A second sample of 17 bulbs chosen from Plant tissue culture laboratory B1 showed a mean life of 1280 hours with a standard deviation of 398 hours. Is there a significant difference between the means of the two laboratories? Use unpaired t-test. (Given $t_{0.05, 25} = 2.06$)

C. The systolic blood pressure of 9 individuals who had been recumbent for 5 minutes was taken. Then 2ml of 0.5% solution of hypotensive drug was given and the blood pressure was recorded again. Did the injection of the drug lower the blood pressure? Use paired t-test (Given $t_{0.05, 8} = 2.31$)

Patient no	1	2	3	4	5	6	7	8	9
Before (BP)	122	121	120	115	126	130	120	125	128
After (BP)	120	118	115	110	122	130	116	124	125

D. Four brands of flashlight batteries are to be compared by testing each brand in five flashlights. Twenty flashlights are randomly selected and divided randomly into four groups of five flashlights each. Then each group of flashlights uses a different brand of battery. The lifetimes of the batteries, to the nearest hour, are as follows.

Brand A	Brand B	Brand C	Brand D
42	28	24	20
30	36	36	32
39	31	28	38
28	32	28	28
29	27	33	25

Preliminary data analyses indicate that the independent samples come from normal populations with equal standard deviations. At the 5% significance level, does there appear to be a difference in mean lifetime among the four brands of batteries? Use the ANOVA test. Each sample size is 5, and the total number of pieces of data is 20. (Given $F_{0.05, df1=3, df2=16} = 3.24$)

Q 5 Write a short note on ANY FOUR of the following

- Monosaccharide
- Competitive inhibitor
- Leg- haemoglobin
- Incomplete linkage
- 5BU as a mutagen
- Differentiate between unpaired t-test and paired t-test.

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