

- (b) A microbiologist observes that a specific rare bacteria appears at an average rate of $\lambda = 3$ cells per microscope field. Calculate the probability of finding exactly 5 bacterial cells in a randomly selected microscope field. (Given $e^{-3} \sim 0.0498$). 4
- (c) Discuss Skewness and Kurtosis with diagrams wherever required. 7
5. (a) Explain Null and Alternative hypotheses. Discuss Type 1 and Type II errors with suitable biological examples. 8
- (b) The mean height of 50 plants is claimed to be 120 cm with a standard deviation of 10 cm. A random sample of 25 plants shows a mean height of 116 cm. Using the Z-test, test the validity of the claim at 5% level of significance. 7
6. (a) The weights (in grams) of an organism under three different diets are given below:
 Diet A: 18, 20, 19
 Diet B: 22, 24, 23
 Diet C: 25, 27, 26 10
- Using one-way ANOVA, test whether there is a significant difference between the mean Weights of organisms (Take $\alpha = 0.05$)
- (b) Write a short note on Correlation coefficient. 5

[This question paper contains 4 printed pages]

Your Roll No. :**Sl. No. of Q. Paper** : 1757 I

Unique Paper Code : 2232013602

Name of the Paper : DSC – Methods in
Biostatistics
NEP - UGCFName of the Course : **B.Sc. (Hons) Zoology**

Semester : VI

Time : 2 Hours **Maximum Marks : 60****Instructions for Candidates :**

- Write your **Roll No.** on the top immediately on receipt of this question paper.
- Use of simple calculator is allowed.
- Statistical tables and graph paper should be provided.
- Attempt **four** questions in all, including Question No. 1 which is compulsory

- (a) Define the following (Any **FIVE**) 1×5=5
 - Biostatistics,
 - Population
 - Sampling
 - Median
 - Standard Deviation
 - Probability

(b) Differentiate between the following (Any **THREE**)
3×2=6

- (i) Primary and Secondary data
- (ii) Discrete and Continuous data
- (iii) Mean and Median
- (iv) Parameter and Statistic

(c) Fill in the blanks 1×4=4

- (i) The study of chance is known as _____.
- (ii) The graphical representation of frequency distribution is called _____.
- (iii) The measure of relative dispersion is known as _____.
- (iv) The probability distribution applicable to rare events is _____ distribution.

2. (a) A botanist performs a dihybrid cross of pea plants and expects a standard Mendelian phenotypic ratio of 9:3:3:1 for four different traits (Round-Yellow, Round-Green, Wrinkled-Yellow, Wrinkled-Green). Out of a total of 320 offspring evaluated, the observed counts are: Round-Yellow 190; Round-Green 55; Wrinkled-Yellow 65; Wrinkled-Green 10. Use the Chi-Square test for Goodness of Fit to evaluate this data.

- (i) State the Null and Alternative hypotheses for this experiment.
- (ii) Calculate the expected frequencies for all four phenotypic categories.

(iii) Compute the total Chi-Square (χ^2) value for the dataset.

(iv) Determine the degrees of freedom for this dataset. 1+2+4+1=8

(b) Describe various sampling methods used in biological research. 7

3. (a) Describe measures of central tendency. Explain mean, median and mode with suitable examples. 7

(b) A pharmacologist is studying the relationship between the dosage of a new drug (in mg) and the reduction in blood pressure (in mmHg) in 5 test subjects. The data is as follows:

Dosage (X): 2, 4, 6, 8, 10

BP Reduction (Y): 5, 9, 14, 20, 24

- (i) Calculate the Pearson Correlation Coefficient (r) to determine the strength and direction of the relationship between drug dosage and BP reduction.
- (ii) Perform a linear regression analysis to find the equation of the regression line ($y=mx + c$) to predict the BP reduction for a given dosage. 4

4. (a) In a specific genetic cross of fruit flies, the probability of an offspring inheriting a recessive mutation is 0.25. If a geneticist isolates 6 offspring, what is the exact probability that exactly 2 of them exhibit the recessive mutation? 4