(i) Printed Pages: 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 2 5 9 4 0

Exam. Code : 0 4 3 5

M.Sc. Bio-Technology 1st Semester

(2124)

BIO-STATISTICS

Paper : MBIO-105

Time Allowed : Three Hours] **[Maximum Marks : 80**

Note :— Attempt **FIVE** questions in all, including Q. No. 1 which is compulsory and selecting **ONE** question from each Unit.

(Compulsory Question)

1. Answer the following :

   (i) What do you mean by tabulation of data ?

   (ii) Define Independent events with suitable example.

   (iii) How can you construct a histogram of the frequency distribution ?

   (iv) Mention the conditions under which the binomial distribution approaches to Poisson distribution.

   (v) State the central limit theorem.

   (vi) Define Type-I and Type-II errors.

   (vii) Explain Factorial designs.

   (viii) Differentiate between discrete and continuous random variables. 8×2

UNIT–I

2. (a) Define Mean, Median and Mode with their merits and demerits.

   (b) Construct the histogram and frequency polygon of the following data :

x	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69
f	17	19	23	28	21	16

8,8

3. (a) Find the Arithmetic Mean, Median, Mode and Standard Deviation of the following data :

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequency	2	6	9	7	4	2

   (b) Prove that probability of complementary event A^C of A is given by $1 - P(A)$.

   (c) Explain the following :

   (i) Equally-Likely Events with examples.

   (ii) Subjective Probability with examples. 10,2,4

UNIT–II

4. (a) Define the following :

   (i) Multiplicative probability theorem

   (ii) Conditional probability

   (iii) Bayes's theorem and its use.

   (b) A man and his wife appear for an interview for two posts. The probability of the husband selection is 1/7 and that of the wife's selection is 1/5. What is the probability that only one of them will be selected ? 9,7

5. (a) The probabilities of X, Y and Z becoming managers are 4/9, 2/9 and 1/3 respectively. The probabilities that the Bonus scheme will be introduced if X, Y and Z becomes manager are 3/10, 1/2 and 4/5 respectively.

(i) What is the probability that the Bonus scheme will be introduced ?

(ii) If the Bonus scheme has been introduced, what is the probability that manager appointed was Y ?

(b) Let A and B be events with $P(A) = 1/4$, $P(B) = 2/5$ and $P(A \cup B) = 1/2$. Find :

(i) $P(A/B)$

(ii) $P(B/A^c)$

(c) Define probability tree diagram and construct a probability tree diagram for tossing a coin three consecutive times.

6,6,4

UNIT–III

6. (a) A random variable X has the following probability function :

Value of X, x	0	1	2	3	4	5	6	7
p(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

(i) Find k

(ii) Evaluate $P(X < 5)$, $P(X \geq 5)$, and $P(0 < X < 6)$

(iii) If $P(X \leq a) > \frac{1}{2}$, find the minimum value of a.

(b) If X be a continuous random variable having pdf

$$f(x) = \frac{3}{8}(4x - 2x^2);\ 0 \le x < 2.$$

Find E(X) and variance of X.

(c) $$f(x) = \begin{cases} c(4x - 2x^2) & ; \quad 0 < x < 2 \\ 0 & ; \quad \text{otherwise} \end{cases}$$

(i) Find the constant c, and

(ii) Find P(X > 1). 8,6,2

7. (a) Define Poisson distribution with probability mass function. Also find its mean, variance and moment generating function.

(b) Find the probability of success 'p' and also the Binomial distribution whose mean is 3 and variance is 2.

(c) Write the properties of Normal distribution. 8,4,4

UNIT–IV

8. (a) Discuss the various advantages and disadvantages of CRD and LSD.

(b) Discuss different methods of collecting primary data. 10,6

9. Define Completely Randomized Design (CRD). Write down its model and discuss the complete statistical analysis of CRD. Also give the ANOVA table. 16