

CBCS SCHEME

17BT41

Fourth Semester B.E. Degree Examination, June/July 2019 Biostatistics and Biomodelling

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Statistical Tables is permitted.**

Module-1

- 1 a. Draw Histogram and Ogive curve for the following data :

Marks (below)	10	20	30	40	50	60	70
No. of students (f)	4	8	11	15	12	6	3

(06 Marks)

- b. Find the quartile deviation from the following table of values.

Age in years	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of patients (f)	1	0	1	10	17	38	9	3

(07 Marks)

- c. Find the mean deviation about the mean given that

No. of Pod shattering plants(x)	0-5	5-10	10-15	15-20	20-25
No. of plants (f)	15	20	25	10	5

(07 Marks)

OR

- 2 a. Find the standard deviation using the following table of values.

Marks (x)	10	20	30	40	50	60
No. of students (f)	8	12	20	10	7	3

(06 Marks)

- b. Find the coefficient of variations of x and y series.

x	27	9	8	5	4
y	9	17	6	5	3

(07 Marks)

- c. Define measure of skewness and kurtosis and state their equations.

(07 Marks)

Module-2

- 3 a. Define correlation (r) between x and y give the suitable equation. Use it find r for the following table of values.

x	10	14	18	22	26	30
y	18	12	24	6	30	36

(06 Marks)

- b. State the regression equation of y on x and x on y and give the equation for correlation in terms of regression coefficients.

(07 Marks)

- c. Fit a straight line as $y = a + bx$ for the following table of values.

x	0	1	3	6	8
y	1	3	2	5	4

(07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 4 a. Two judges in a beauty competition rank the following ranks are given, find the rank correlation coefficient given that

Ranks of x-series	1	2	3	4	5	6	7	8	9	10	11	12
Ranks of y-series	12	9	6	10	3	5	4	7	8	2	11	1

(06 Marks)

- b. Find the regression equations of y on x and x on y for the following table of values.

x	1	2	3	4	5
y	2	5	3	8	7

(07 Marks)

- c. Derive normal equations to find a, b and c in second degree parabola $y = a + bx + cx^2$ using least square method.

(07 Marks)

Module-3

- 5 a. Two machines M_1 and M_2 in a factory produce the following : F_1 produce 30% of the items of the output, of which 5% are defective, F_2 produce 70% of the items, of which 1% are defective. An item is drawn at random and is defective. What is the probability that it is drawn from F_2 ? (Use Baye's rule). (06 Marks)
- b. Explain Hardy Weinberg law. (07 Marks)
- c. The probability density function of the variate X is given below, find (i) $P(X < 4)$, (ii) $P(X \geq 5)$ and (iii) $P(3 < X \leq 6)$ by obtaining the value of K. (Assume the random variable X is discrete one) given that

X	0	1	2	3	4	5	6
P(x)	K	3K	5K	7K	9K	11K	13K

(07 Marks)

OR

- 6 a. A problem in one subject is given to five students their chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$. What is the probability of solving the problem? (06 Marks)

- b. Discuss briefly on the multiple alleles and the possibilities of groups for genotypes and phenotypes. (07 Marks)

- c. A continuous random variable x has the following density function

$$P(x) = \begin{cases} Kx^2, & -3 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases} \text{ find K such that calculate } P(1 \leq x \leq 2) \text{ and } P(x \leq 2). \quad (07 \text{ Marks})$$

Module-4

- 7 a. The probability that an item manufactured by a company is $\frac{1}{10}$. If 12 such items are manufactured find the probability that (using Binomial distribution)

- i) Exactly two will be defective
 ii) At least two will be defective
 iii) None will be defective.

(06 Marks)

- b. Derive the constants of Binomial distribution. (07 Marks)

- c. In a normal distribution, 31% of the items are under 45 and 8% are over 64, find the mean and standard deviation of the distribution. (07 Marks)

OR

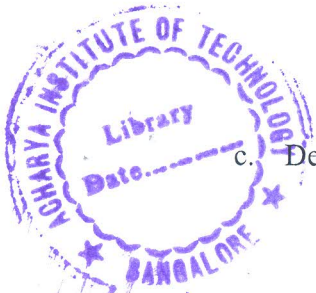
- 8 a. Derive the constants of binomial distribution. (06 Marks)

- b. Fit a normal distribution to the following data :

x	2	4	6	8	10
f	1	4	6	4	1

Find the expected frequencies.

(07 Marks)



- c. Define with suitable equations (statements only)
- Exponential distribution
 - Mean and variance of exponential distribution
 - T-Distribution.

(07 Marks)

Module-5

- 9 a. Fit a Poisson distribution to the following data and test the goodness of fit given that

x	0	1	2	3	4
f	419	352	154	56	19

$$(X_{0.05}^2 = 7.82 \text{ at } (4 - 1) \text{ d.f.})$$

(10 Marks)

- b. Explain Lotka Volterra model on prey predator for interacting species.

(10 Marks)

OR

- 10 a. Two independent random samples each of size 8 is given below. Can these samples be regarded as drawn from the normal populations with the same variance?

Sample A	63	64	65	65	66	67	68	66
Sample B	69	66	67	67	66	68	69	69

$$(F_{0.05} = 3.8 \text{ for } 7 \text{ d.f.})$$

(10 Marks)

- b. Explain microbial growth in a Chemostat with a reference to Mutualism.

(10 Marks)
