



CBCS SCHEME

18BT31

Third Semester B.E. Degree Examination, Jan./Feb. 2023 Biostatistics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find Mean, Median, Mode for the given data:

Class Interval [Blood Glucose]	69-76	76-83	83-90	90-97	97-104	104-111	111-118
Number of days	6	9	8	3	2	1	2

(10 Marks)

- b. From the following data draw: i) Histogram ii) Frequency polygon iii) Frequency curve
iv) Histogram and frequency polygon.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	6	7	14	16	14	8	6	5

(10 Marks)

OR

- 2 a. Plant yield in grams of a Bengal gram variety is given below. Calculate the mean, the variance, the standard deviation and the coefficient of variation.

Plant yield (gms) = 17.0, 19.1, 20.0, 20.7, 21.2, 22.7, 22.7, 23.1, 25.2, 26.2.

(10 Marks)

- b. Define:

- Factorial design
- Clutter design
- Historically controlled studies
- Completely randomized block design.

(10 Marks)

Module-2

- 3 a. If the mean and standard deviation of the number of correctly answered questions in a test given to 4096 students are 2.5 and $\sqrt{1.875}$. Find an estimate of the number of candidates answering correctly.

- i) 8 or more questions ii) 2 or less iii) 5 questions.

(10 Marks)

- b. In a test on electric bulbs, it was found that the life time of a particular brand was distributed normally with an average life of 2000hrs and standard deviation of 60 hours. If a firm purchases 2500 bulbs find the number of bulbs that are likely to last for i) more than 2100 hours ii) less than 1950 hours iii) between 1900 to 2100 hours [$\phi(1.67) = 0.4525$, $\phi(0.83) = 0.2967$].

(10 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. Define: i) Basics of study design (any 2) ii) Cohort studies iii) Interval estimation
iv) Point estimation. (10 Marks)
- b. In an examination 7% of students score less than 35% marks and 89% of students scores less than 60% marks. Find the mean and standard deviation, if the marks are normally distributed. It is given that if

$$P(Z = \frac{1}{\sqrt{2\pi}} \int_0^z e^{-z^2/2} dz \text{ then } P(1.2263) = 0.39 \text{ and } P(1.4757) = 0.43. \quad (10 \text{ Marks})$$

Module-3

- 5 a. A psychologist wanted to compare two method A and B of teaching. He selected a random sample of 22 students. He grouped them into 11 pairs so that the students in a pair have approximately equal scores on an intelligence test. In each pair one student was taught by method A and the other by method B and examined after the course. The marks obtained by them are tabulated below.

Pair	1	2	3	4	5	6	7	8	9	10	11
A	24	29	19	14	30	19	27	30	20	28	11
B	37	35	16	26	23	27	19	20	16	11	21

Find the rank correlation coefficient. (10 Marks)

- b. The lines of regression are:
 $8x - 10y + 66 = 0$, $40x - 18y = 214$
 The variance of x is 9. Find:
 i) The mean values of x and y
 ii) Correlation coefficient between x and y
 iii) Standard deviation of y. (10 Marks)

OR

- 6 a. The time taken by workers in performing a job by method I and method II is given below:

Method I :	20	16	26	27	23	22	
Method II :	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which there samples are drawn do not differ significantly? [$F_{0.05}(6,5) = 4.95$]. (10 Marks)

- b. Two types of batteries are tested for their length of life and the following results were obtained
 Battery A : $n_1 = 10$, $\bar{x}_1 = 510$ hrs, $\sigma_1^2 = 100$
 Battery B : $n_2 = 10$, $\bar{x}_2 = 500$ hrs, $\sigma_2^2 = 121$
 Compute students t test whether there is a significant difference in the two means [$t_{0.05}$ at 18d.f = 2.101]. (10 Marks)

Module-4

- 7 a. Explain about the missing plot technique in randomized complete block design model. (10 Marks)
- b. A set of data involving four tropical feed stuffs A, B, C, D tried on 20 chicks is given below. All the twenty chicks are treated alike in all respects except the feeding treatments and each feeding treatment is given to 5 chicks. Analyze the data using CRD. Weight gain of baby chicks fed on different feeding materials composed of tropical feed stuffs:

	A	B	C	D	Total	
A	55	49	42	21	52	219
B	61	112	30	89	63	355
C	42	97	81	95	92	407
D	169	137	169	85	154	714

[F(3, 16) at 0.05 level = 3.24
F(3, 16) at 0.01 level = 5.29].

(10 Marks)

OR

- 8 a. Explain about completely randomized block design. (10 Marks)
- b. The data recorded for yield in a randomized block design experiment involving six treatments in four randomized blocks, are given below. Analyze the data and test whether the treatments differ significantly.

Blocks	Treatments					
	1	2	3	4	5	6
1	24.7	20.6	27.7	16.2	16.2	24.9
2	27.3	28.8	22.9	15.0	17.0	22.5
3	38.5	39.5	36.8	19.6	15.4	26.3
4	28.5	31.0	34.9	14.1	17.7	22.6

[Note : $F_{0.05}(5, 15) = 2.90$ $F_{0.05}(3, 15) = 3.29$].

(10 Marks)

Module-5

- 9 a. Explain about the sample t-test in SAS. (10 Marks)
- b. Write the SAS representation of simple bar chart for the length of cars as bars. (10 Marks)
- OR**
- 10 a. Explain about PROC statements in SAS. (10 Marks)
- b. How does ANOVA can be computed in SAS? Mention the parameters used for ANOVA in SAS programming. (10 Marks)
