



CBCS SCHEME

20BBI/BBC/BBT/FDB11

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First Semester M.Tech. Degree Examination, Jan./Feb. 2021 Numerical Methods and Biostatistics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Briefly explain about the graphical representation of the data. (10 Marks)
b. Find the arithmetic mean, median and mode for the following data :

Weight in Kgs :	93-97	98-102	103-107	108-112	113-117	118-122	123-127	128-132
No. of students	3	5	12	17	14	6	3	1

(10 Marks)

OR

- 2 a. Explain the significance of statistics to biological problems. (10 Marks)
b. The following table gives the distribution of monthly income of 600 families in a certain city.

Monthly income ('00 Rs) :	Below 75	75-150	150-225	225-300	300-375	375-450	450 and over
No. of families :	60	170	200	60	50	40	20

Draw a 'Less than' and 'More than' Ogive curve for the same data: (10 Marks)

Module-2

- 3 a. Write a note on testing of hypothesis, parameter estimation and level of significance. (10 Marks)
b. The following data are the number of seeds germinating out of 10 on damp filter paper for 80 sets of seeds. Fit the binomial distribution for the following data :

X :	0	1	2	3	4	5	6	7	8	9	10
f :	6	20	28	12	8	6	0	0	0	0	0

(10 Marks)

OR

- 4 a. Define the following : (10 Marks)
i) Discrete random variable
ii) Continuous random variable
iii) Logarithmic transformation
iv) Cohort studies
v) Case control studies.
b. The hourly wages of 1000 workers are normally distributed around a mean of Rs. 70 and with a standard deviation of Rs.5. Estimate the number of workers whose hourly wages will be i) between Rs. 69 and Rs. 72 ii) more than Rs. 75 iii) less than Rs. 63.

Given : $\phi(0.2) = 0.0793$, $\phi(0.4) = 0.1554$

$\phi(1) = 0.3413$ $\phi(1.4) = 0.4192$.

(10 Marks)

Module-3

- 5 a. From the following table, calculate the coefficient of correlation.

X :	6	2	10	4	8
Y :	9	11	-	8	7

Arithmetic means of X and Y are 6 and 8 respectively.

- b. Define correlation and linear regression. Obtain the angle between the two lines of regression and discuss the nature of the lines for the following particular cases.
i) $\gamma = \pm 1$ ii) $\gamma = 0$.

(10 Marks)

(10 Marks)

OR

- 6 a. Describe signed-Ranks. Describe signed rank test for small samples. (08 Marks)
b. A trucking company wishes to test the average life of each of the four brands of tyres. The company uses all brands on randomly selected trucks. The records showing the lives (thousand of kms) of tyres is given below:

Brand 1	Brand 2	Brand 3	Brand 4
20	19	21	15
23	15	19	17
18	17	20	16
17	20	17	18
	16	16	

Test the hypothesis that the average life for each brand of tyres is same at $\alpha = 0.01$. Given : $F(3, 14) = 5.56$ at $\alpha = 0.01$.

(12 Marks)

Module-4

- 7 a. Describe Random block design and completely randomized block design. (10 Marks)
b. Three varieties of a crop are tested in a RBD with 4 replications, the layout being given in the table. The plot yields are also given. Analyze the experimental yield and state your conclusions.

A 6	C 5	A 8	B 9
B 8	A 4	B 6	C 9
C 7	B 6	C 10	A 6

Given : $F(3, 6) = 4.76$, $F(2, 6) = 5.14$ at 5% level of significance.

(10 Marks)

OR

- 8 a. Describe biological study design and polynomial Regression. (10 Marks)
b. Fit a second order polynomial for the given data and determine the total standard deviation standard error, and the coefficient of correlation.

x_i :	0	1	2	3	4	5
y_i :	2	8	14	27	41	61

(10 Marks)

Module-5

- 9 a. Give an account of microarray analysis with reference to DNA. (10 Marks)
b. What are the basic steps in designing microarray experiments? (10 Marks)

OR

- 10 a. Discuss genome mapping and strategies for measuring distance between genes. (10 Marks)
b. What are the types of microarrays? Discuss the advantages, drawbacks and uses of each one of them. (10 Marks)
