

# CBCS SCHEME

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18BT31

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020

## Biostatistics

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Construct an Histogram and frequency polygon for the following table of values.

Protein intake (gms) (x)	15-25	25-35	35-45	45-55	55-65	65-75	75-85
Number of families (f)	30	40	100	110	80	30	10

(07 Marks)

- b. Find the mean and standard deviation form the following data :

Marks (x)	10-20	20-30	30-40	40-50	50-60	60-70
No. of students (f)	8	12	20	10	7	3

(07 Marks)

- c. Define i) Coefficient of variation of  $\bar{x}$  ii) Factorial design iii) Cluster design.

(06 Marks)

OR

- 2 a. Draw a cumulative less than and cumulative greater than curve for the following data :

(07 Marks)

No. of pots (x)	10	20	30	40	50	60
No. of plants (f)	3	9	15	30	18	5

- b. Find the mean deviation about the mean for the data given below :

(07 Marks)

Class interval	0-4	4-8	8-12	12-16	16-20
Frequency	4	6	8	5	2

- c. Define : i) Replication ii) Randomisation iii) Historical controlled study.

(06 Marks)

### Module-2

- 3 a. Define i) Basics of study design (any two) ii) Cohort studies  
iii) Measure of spread iv) Interval estimation. (10 Marks)  
b. The probability of recovery for some severe infection is 0.4. Five children are with severe infection. Find the probability that i) Five will recover ii) Four will recover  
iii) Four or more will recover iv) At the most three will recover. (Use Binomial distribution). (10 Marks)

OR

- 4 a. Explain in brief : i) Logarithmic transformation ii) Hypothesis testing  
iii) Point estimation iv) Principle of local control in study design. (10 Marks)  
b. Among diabetics, the fasting blood glucose level (x) may be assumed to be approximately normally distributed with mean 106 mg/100 ml and standard deviation 8mg/100ml. Find the probability that i) Less than or equal to 120mg/100 ml  
ii) Between 106mg/ 100ml and 110 mg/100 ml iii) More than 121mg/100 ml.  
iv) What percentage of diabetics have levels between 90 and 120mg/100 ml.  
(Area under normal curve are :  
For i) 0.4599 ii) 0.1915 iii) 0.4686 iv) 0.4772 , 0.4599). (10 Marks)

**Module-3**

- 5 a. Define Mann – Whitney – Wilcoxon U – Test statistic with suitable equation. State equations for  $\mu$ ,  $\sigma^2$  and Z. (07 Marks)
- b. Find the correlation for the following table of values :

Heights of father (inches) (x)	65	66	67	68	69	70	71
Heights of sons (inches) (y)	67	68	66	69	72	72	69

(07 Marks)

- c. Find the regression equation of y on x and x on y given that ,

Time (x) (min)	0	5	10	15	20
Diastolic blood pressure (y)	72	67	70	65	66

(06 Marks)

**OR**

- 6 a. Find the Rank correlation using Spearman's method given that

x	8	36	98	25	75	82	92	62	65	35
y	84	51	91	60	68	62	86	58	35	49

(08 Marks)

- b. Set up an analysis of variance table for the following per acre production data for three varieties of wheat each grown on 4 plots and state if the variety differences are significant.

Per Acre Production data			
Plot of Land	Variety of Wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

(Table value  $F_{0.05} = 4.26$  at (2, 9) d.f).

(12 Marks)

**Module-4**

- 7 a. Explain in brief : i) Random block design (RBD) with suitable ANOVA table  
ii) Stratified design iii) Model fitting. (08 Marks)
- b. Three varieties A, B, C of a crop are tested in a randomized block design with four replications. The plot yields in pounds are as follows :

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

Analyse the experimental yield.

(Table value :  $F_{0.05} = 5.14$  at (2, 6) df ,  $F_{0.05} = 4.76$  at (3, 6) df).

(12 Marks)

**OR**

- 8 a. Explain in brief : i) Completely Randomized block design (RCBD)  
ii) Biological study design iii) Multiple sources of variation. (08 Marks)
- b. Analyse the following observations with A, B, C, d as treatments.

Row \ Column	1	2	3	4
1	A(12)	D(20)	C(16)	B(10)
2	D(18)	A(14)	B(11)	C(14)
3	B(12)	C(15)	D(19)	A(13)
4	C(16)	B(11)	A(15)	D(20)

(Table value  $F_1 = 27.91$  ,  $F_2 = 27.91$  ,  $F_3 = 27.91$  at 3 d.f for 1% level of significance)

(12 Marks)

**Module-5**

- 9 a. Define i) Variables ii) Arrays iii) Input methods  
iv) Output delivery system in SAS programming. (08 Marks)
- b. What is Bar Chart in SAS? Write the basic syntax to create a SAS Bar Chart. Represent the following data in SAS Bar Chart, given that

Product (x)	A	B	C	D	E	F	G	H
Total sales (f) (Rs in thousands)	10	20	30	40	60	25	18	9

(12 Marks)

**OR**

- 10 a. Discuss in brief :
- String variables in SAS
  - Merging of Data in SAS
  - Arithmetic mean in SAS
  - Linear regression in SAS. (08 Marks)
- b. i) What is ANOVA in SAS?  
ii) Write the basic syntax for applying PROC ANOVA in SAS.  
iii) Mention the parameters used for ANOVA in SAS programming. (12 Marks)

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