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18BT31

Third Semester B.E. Degree Examination, June/July 2025
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. **(07 Marks)**

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

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 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 :

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

(07 Marks)

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

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

(07 Marks)

c. Define : i) Replication ii) Randomisation iii) Historical controlled study. **(06 Marks)**

Module-2

3 a. The life expectancy [in months] of 212 catla fishes are given below. Calculate the mean deviation from mean and co-efficient of variance

Life expectancy (in months)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of fishes	20	25	32	40	42	35	10	8

(10 Marks)

b. The following data are taken from a study investigating the use of technique called radionuclide Ventriculography as a diagnostic test for detecting coronary artery disease.

Test	Disease		Total
	Present	Absent	
Positive	302	80	382
Negative	179	372	551
Total	481	452	933

i) What is the sensitivity of radionuclide Ventriculography in this study?
ii) What is it specificity? **(06 Marks)**

c. For several different methods of contraception, the probabilities that a currently married woman experiences an unplanned pregnancy during the first year of use are given in the table.

Method of contraception	None	Diaphragm	Condom	IUD	Pill
Probability of pregnancy	0.431	0.149	0.106	0.071	0.037

For each method listed, calculate the relative risk of pregnancy for women using the method versus women not using any type of protection. **(04 Marks)**

OR

4 a. Among the 1820 subjects in a study, 30 suffered from tuberculosis and 1790 did not. Chest X – rays were administered to all individuals. 73 had a positive X – ray implying that there was significant evidence of inflammatory disease – whereas the result of the other 1747 were negative. The data for this study are presented in the table below. What is the probability that a randomly selected individual has tuberculosis given that his (or) her x – ray is positive? **(10 Marks)**

X - ray	Tuberculosis		Total
	No	Yes	
Negative	1739	8	1747
Positive	51	22	73
Total	1790	30	1820

b. The accompanying data on families with 6 children are taken for the study. Fit a binomial distribution to the data. Find the Mean , Variance and Moment of Skewness (MSK).

Number of		Number of families
Boys	Girls	
0	6	1,096
1	5	6,233
2	4	15,700
3	3	22,221
4	2	17,332
5	1	7,908
6	0	1,579
		72,069

(10 Marks)

Module-3

5 a. To test the claim that the median age of diabetic patent in state community is less than 42 years. A survey from a random sample of 32 diabetic patent yields the following ages in years.
56, 62, 61, 54, 52, 32, 24, 35, 50, 42, 52, 49, 26, 31, 31, 54, 38, 36, 45, 53, 37, 40, 38, 31, 29, 25, 45, 52, 48, 39, 30, 38. Use Wilcoxon signed rank test at 5% level of significance.
(12 Marks)

b. Calculate coefficient of correlation from the following data by Spearman's rank correlation method.

Series X	20	11	24	18	20	22
Series Y	24	9	20	22	9	11

(08 Marks)

OR

6 a. Find coefficient of correlation between the height of father and sons from the following data

Height of father (X)	65	66	67	68	69	70	71
Height of Sons (Y)	67	68	68	69	72	72	69

(08 Marks)

b. A farmer applies 3 types fertilizers on 4 separate plots. The figure on yield/acre is tabulated below. Find out plots are materially different in fertility as also in the 3 fertilizers make any material difference in fields. **(12 Marks)**

Fertilizer	plots			
	A	B	C	D
Nitrogen	6	4	8	6
Potash	7	6	6	9
Phosphates	8	5	10	9

$F_{0.005}(2, 6) = 5.14$; $F_{0.05}(3, 6) = 4.76$.

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. Write SAS representation of histogram for considering the minimum and maximum values of horse power and take a range of 50, so the values from a group is steps of 50. The mid points are from 70 to 550. Fit the distribution curve with mean and SD values mentioned as EST. **(10 Marks)**

b. Write the SAS representation of simple bar chart for representing the length and cars as bars. **(10 Marks)**

OR

10 a. Write the SAS representation for the one sample t – test comparing the mean of the variable weight – loss in the clinic group for a pre – selected value of 4 and alpha value of 0.1. **(10 Marks)**

b. Explain about the different statements available in PROC TEST. **(10 Marks)**

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