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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2180403 **Date:17/05/2019**

Subject Name:Biostatistics

Time:10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Necessary tables are given in the same paper at the end. Total 6 pages are printed including tables.**

			MARKS
Q.1		Perform an analysis of variants for the data given as under.	**03**

Lyophilizer						
	A	**B**	**C**	**D**	**E**	**F**
Rutul	6	5	6	7	4	3
Dinesh	9	7	8	3	2	8
Nathu	3	5	4	6	2	1
Mona	5	9	8	3	4	2
Koena	1	2	4	7	6	5

The data is given for five different lyophilizes for the same kind of biological samples by performing individual experiments. The figure corresponds to number of samples without contamination. Comment on productivity.

Q.2	**(a)**	Find the median of the data: 36, 28, 11, 5, 41, 86, 3 and 8.	**03**
	(b)	Differentiate between histogram, pie chart, bar chart and map diagram.	**04**
	(c)	A population of cats is known to have 160 heart beats per minute. When 13 cats were each fed on a fixed quantity of a drug and data taken on their beats, the mean $\bar{X}$ =147 with S=27.5. Find if there is a change in heart beat due to drug.	**07**

OR

	(c)	In pharmacological experiments, six mice were injected with 0.5 mg of medicine. They had taken on an average 15.4 seconds to fall asleep with an unbiased standard deviation 2.2 seconds. While six other mice injected with 1.5 mg of the medicine, took on an average 11.2 seconds to fall asleep with an unbiased standard deviation of 2.6 seconds. Use the 5% level of significance to test the null hypothesis that the difference in dosage has no effect.	**07**
Q.3	**(a)**	Differentiate between Geometric mean and harmonic mean.	**03**
	(b)	The mean age of 40 students is 16 years and the mean age of another group of 60 students is 20 years. Find out the mean age of all 100 students combined together.	**04**
	(c)	Data recorded in length of carrots (cms). Calculate the standard	**07**

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deviations from mean and median both.
Lengths (cms) = 9.2, 9.6, 10.0, 11.0, 12.0, 9.8, 10.2, 9.7, 12.7, 10.6

OR

Q.3 **(a)** Define: inferential biostatistics and descriptive biostatistics **03**

(b) What are the scopes of biostatistics? **04**

(c) The data recorded on the number of chlorophyll deficient plants in a lentil population are given below. Calculate the arithmetic mean. **07**

Number of chlorophyll Deficient plants	0	1	2	3	4	5
Number of plants	34	14	20	24	25	33

Q.4 **(a)** Write steps for chi-square test. **03**

(b) Find the average rate of increase in tiger population which in first decade had increased by 20%, in the second decade by 30% and in the third by 40%. **04**

Decade	1	2	3
Rate of increase in tiger's population	20%	30%	40%

(c) A survey of 320 families with 5 children in each family provides following data: **07**

No. of families	No. of Boys	No. of Girls
14	5	0
56	4	1
110	3	2
88	2	3
40	1	4
12	0	5
320	17	15

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Dose this data supports the hypothesis that there is equal probability of male and female births?

OR

Q.4 **(a)** Define: probability, skewness, kurtosis. **03**

(b) Calculate percentile for value 12 from the following data: **04**
13, 11, 10, 13, 11, 10, 8, 12, 9, 9, 8, 9.

(c) Fit a second degree parabola to the following data. **07**

X	1.5	2.0	2.5	30	3.5	4.0
Y	1.3	1.6	2.0	2.7	3.4	4.1

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Q.5 **(a)** What is type-I and type-II error? **03**

(b) Calculate the mean deviations for numbers of patients visited a doctor in 10 days for blood glucose test. **04**

27, 22, 20, 30, 31, 32, 35, 40, 45, 48.

(c) Calculate mean and variance of the data set given. **07**

Class Interval	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70
No. of fields 'f'	2	3	8	12	16	5	2	2

OR

Q.5 **(a)** Write down limitations of statistical methods. **03**

(b) Hb% of patients of a waved was recorded as 7,8,9,10,11,12,13,14.5,15 and 15.5 g/100 ml. Find out the variance of data. **04**

(c) In an ontological examination of schoolchildren, out of 146 children examined 21 were found to have some type of ontological abnormalities. Does it confirm with the statement that 20% of the schoolchildren have ontological abnormalities? **07**

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Selected values of normal distributions

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Level of significance	Z value- two tailed test	Z value- one tailed test
0.10	1.645	1.282
0.05	1.96	1.645
0.02	2.326	2.054
0.01	2.576	2.326
0.001	3.291	3.090

Table : Values of F at the 5% Significance Level

DoF- denominator	DoF- numerator								
	1	2	3	4	5	6	7	8	9
1	161	200	216	225	230	234	237	239	241
2	18.50	19.00	19.20	19.20	19.30	19.30	19.40	19.40	19.40
3	10.10	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.40	6.59	6.39	6.26	6.16	6.09	6.04	6.00
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80.
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
30	4.17	.3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04

Table: Values of F at The 1% Significance Level

DoF-denominator	DoF- numerator								
	1	2	3	4	5	6	7	8	9
1	4052	5000	5403	5625	5764	5859	5928	5982	6022
2	98.50	99.90	99.20	99.20	99.30	99.30	99.40	99.40	99.40
3	34.10	30.80	29.50	28.70	28.20	27.09	27.70	27.50	27.30
4	21.20	18.00	16.70	16.00	15.50	15.20	15.00	14.80	14.70
6	13.70	10.90	9.78	9.15	8.75	8.47	8.26	8.10	7.98
8	11.30	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
10	10.00	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
14	8.86	6.51	5.56	5.04	4.70	4.46	4.28	4.14	4.03
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72

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Table value of "t" at different degrees of freedom on P=0.05 and 0.01 level

V	P	
	0.05	**0.01**
1	6.314	31.821
2	2.920	6.965
3	2.353	4.541
4	2.132	3.747
5	2.015	3.365
6	1.943	3.143
7	1.895	2.998
8	1.860	2.896
9	1.833	2.821
10	1.812	2.764
11	1.796	2.718
12	1.782	2.681
13	1.771	2.650
14	1.761	2.624
15	1.753	2.602
16	1.746	2.583
17	1.740	2.567
18	1.734	2.552
19	1.729	2.541
20	1.725	2.528
21	1.721	2.518
22	1.717	2.508
23	1.714	2.500
24	1.711	2.492
25	1.708	.2.485
26	1.706	2.479
27	1.703	2.463
28	1.701	2.467
29	1.699	2.462
30	1.697	2.457
40	1.684	2.423
60	1.671	2.390
120	1.658	2.338

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Table: Distribution of $\chi 2$ corresponding to different levels of significance

Degree of freedom(df)	Probability (P)		
	0.05	0.01	0.001
1	3.84	6.64	10.83
2	5.99	9.21	13.82
3	7.82	11.35	16.27
4	9.49	13.29	18.47
5	11.07	15.09	20.52
6	12.59	16.81	22.46
7	14.07	18.48	24.32
8	15.51	20.09	26.13
9	16.92	21.67	27.88
10	18.31	23.21	29.59
11	19.68	24.73	31.26
12	21.03	26.22	32.91
13	22.36	27.69	34.53
14	23.69	29.14	36.12
15	25.00	30.58	37.70
16	26.30	32.00	39.25
17	27.59	33.41	40.79
18	28.87	34.81	42.31
19	30.14	36.19	43.82
20	31.41	37.57	45.32
21	32.67	38.93	46.80
22	33.92	40.29	48.27
23	35.17	41.64	49.73
24	36.42	42.98	51.18
25	37.65	44.31	52.62
26	38.89	45.64	54.05
27	40.11	46.96	55.48
28	41.34	48.28	56.89
29	42.56	49.59	58.30
30	43.77	50.89	59.70

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