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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:180403 **Date:07/05/2016**

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. **All necessary charts are provided with this question paper itself.**

Q.1 An agricultural experiment making *Latin square design* gave the following results for the yield of wheat in tonnes per acre. Letters A, B, C, D, E co-responds to different variants of wheat. **14**

A	16	B	10	C	11	D	9	E	9
E	10	C	9	A	14	B	12	D	11
B	15	D	8	E	8	C	10	A	18
D	12	E	6	B	13	A	13	C	12
C	13	A	11	D	10	E	7	B	14

Q.2 **(a)** In a survey, on hearing levels of schoolchildren with normal hearing, it was found that in the frequency 350 cycles per second, 55 children tested in the sound proof room had a mean hearing threshold of 15.5 decibels with a standard deviation of 6.5. and 76 comparable children who were tested in the fields had mean threshold of 18.0 decibels with a standard deviation of 7.8. Test, if there is any difference between the hearing levels recorded in the sound proof room and in the field. **07**

(b) 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 X =147 with S=27.5. Find if there is a change in heart beat due to drug. **07**

OR

(b) In a pig form a group of 12 pigs were fed with one variety of food A while another group of 12 pigs of same age. Features were given another variety of food B. After one month weight of both groups were related as follows. **07**

Group 1	**Group 2**
Food A	**Food B**
31	26
34	24
34	28
29	29
26	30
32	29
35	32
38	26
40	35
36	29

Whether the difference in mean weight of the first and second group due to food quality is significant or not?

Q.3 **(a)** In a clinical treatment, the patients were tested to see the effect of a potential hypertensive drug. The 50 patients were assigned to receive drug and other 50 as placebo at random. Their response to treatment was categorized as favorable or unfavorable. The data is given in the table below: **07**

Treatment	**Response**		**Total**
	Un favorable	**Favorable**	
Placebo	41	9	50
Drug	16	34	50
	57	34	100

Test the hypothesis that drug has significant effect. Assume level of significance 1%.

(b) Data on waxy endospermic plants were recorded in maize. Calculate the standard deviation from the following data: **07**

Waxy endospermic Plants	7	8	9	10	11	12
No.of Plants	13	13	18	17	15	14

OR

Q.3 **(a)** 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

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

(b) Find out co- efficient of co-relation from the given data by Spearman's rank co-relation and Karl Pearson's Method. Comment on results. **07**

X	80	70	61	56	45
Y	31	36	21	28	19

Q.4 **(a)** Determine an equation to fit a straight line for the best feed from the data given. **07**

X	8	4	5	-1
Y	-2	0	2	6

(b) Define geometric mean and Harmonic mean? Give equations and their **07**

advantages as well as limitations.

OR

Q.4 **(a)** Growth of bacteria (N) in a culture after t hours is given by the following table. Fit the curve of the form $N=ab^t$ and estimate n when t=7. **07**

T	0	1	2	3	4	5	6
N	32	47	65	92	132	192	275

(b) Discuss the relation between mean, median and mode by taking an example. **07**

Q.5 **(a)** Explain the limitations of biostatistics. **07**

(b) Define: Probability, Probability Distributions, Event, Mutually exclusive event, Null Event, Dependent Event, Independent Event **07**

OR

Q.5 **(a)** Summarize the applications of biostatistics in the field. **07**

(b) Define: sample, unit, population, biometry, inferential biostatistics, accuracy, precision. **07**

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Selected values of normal distributions

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

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

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