Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER–VIII • EXAMINATION – SUMMER • 2014

Subject Code: 180403 **Date: 03-06-2014**

Subject Name: Biostatistics

Time: 10.30 am - 13.30 pm **Total Marks: 70**

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Standard necessary charts are provided in this question paper.
5. Take table value for 5% level of significance as 1.96 for normal distribution.

Q.1 The following data resulted from an experiment to compare 3 burners P, Q, and R. *Latin Square Design* was used as the tests were made 3 engines and were spread over three days. **14**

Day	Engines		
Monday	P 16	Q 17	R 20
Thursday	Q 16	R 21	P 15
Friday	R 15	P 12	Q 13

Q.2 (a) In an ontological examination of infants, out of 145 infants examined 20 were found to have some type of ontological abnormalities. Does it confirm with the statement that 20% of the infants have ontological abnormalities? Test the hypothesis. **07**

(b) Explain the types of probability. **07**

OR

(b) How would you select the appropriate measure of central tendency? **07**

Q.3 (a) An experiment gave the following values: **07**

v (ft/min)	350	400	500	600
t (min)	1.62	1	0.75	0.62

It is known that are connected by the relation $v = at^b$. Find the best possible values of 'a' and 'b'.

(b) Calculate the rank correlation for the following data for marks in Molecular Biology and Immunology, by Spearman's method. **07**

Mol. Bio.	8	36	98	25	75	82	92	62	95	35
Immunology	84	51	91	60	68	62	86	58	35	49

OR

Q.3 (a) The pressure and volume of a gas are related by the equation $pV^{\gamma} = k$ where γ and k being constants. Fit this equation to the following set of f observations: **07**

P (kg/cm^2)	0.5	1	1.5	2	2.5	3
V (litres)	1.62	1	0.75	0.62	0.52	0.46

(b) In a poster making technical event, 10 competitors [A to J] are ranked by two judges in following order. Calculate the coefficient correlation. **07**

	A	B	C	D	E	F	G	H	I	J
Rank by Judge 1	1	4	8	9	6	10	7	3	2	10
Rank by Judge 2	4	8	7	5	9	6	10	2	3	1

Q.4 (a) The percentage of vitamin-A in two varieties of mangoes were found out and the following results were obtained: **07**

Variety	Average Vitamin-A content	Number of mangoes(n)	Standard Deviation (S)
Junagadh	92%	12	15%
Valsad	84%	15	19%

Find out whether there is significant difference in Vitamin –A contents of two varieties.

(b) The following frequency distribution gives the number of chillies per plant. Calculate the mean deviations from the mean for the number of chillies per plant. **07**

No. of Chillies per plant	10-16	17-23	24-30	31-37	38-44	45-51
No. of Plants	8	10	23	29	18	12

OR

Q.4 (a) The weight of 10 guinea pigs (in grams) when brought in the laboratory and after one month were recorded in the following table. Calculate and conclude whether the gain in weight is statistically significant or not. **07**

Guinea Pig	Weight (in gram)									
In the beginning	49	41	37	41	42	37	39	38	41	35
After one month	52	43	46	52	46	38	42	41	42	38

07

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

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

Q.5 (a) A survey of 320 families with 5 children in each family provides following data:. Dose this data supports the hypothesis that there is equal probability of male and female births? **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

(b) Write a note on testing a hypothesis. **07**

OR

Q.5 (a) Explain the role of Biostatistics in modern research. **07**

(b) Give the definitions: Mode, Population, Variance, Quartiles, Geometric Mean, Harmonic Mean, Histogram. **07**

****

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