Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2021

Subject Code:3150409 Date:15/12/2021

Subject Name:Biostatistics

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

MARKS

Q.1 **(a)** State the difference between standard and mean deviation. **03**

(b) Define: Kurtosis, Accuracy, precision, skewness **04**

(c) Calculate the Mean Deviation of the data: **07**

Class interval	Frequency, f
1-10	3
11-20	11
21-30	7
31-40	4
41-50	15
51-60	0
61-70	7
71-80	3

Q.2 **(a)** What is Histogram and pie chart? What kind of data do they represent? **03**

(b) calculate the Z-score for the value of 12 in the following data set: **04**

3 8 6 14 4 12 7 10

(c) Find the mean of the following data. **07**

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
f	42	44	58	35	26	25

OR

(c) Find out the standard deviation. **07**

Class interval	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of fields, f	1	4	14	20	22	12	2

Q.3 **(a)** Define Correlation and Regression. **03**

(b) By applying Binomial theorem, calculate the probability of having 2 male and 2 female children in a family of 4. **04**

(c) Pulse rate of 50 persons is given below. Calculate the regression value. **07**

Pulse rate (x)	67	68	69	70	71	72	73	74	75	76
Persons(f)	4	5	3	2	7	10	11	3	2	3

OR

Q.3 **(a)** What does level of significance indicate? **03**

(b) 4 Samples were taken for protein content while analyzing for genetic studies, find out co- efficient of variants. **04**

Sr. No.	1	2	3	4

Protein Conc.(µl)	0.12	0.14	0.04	0.08

(c) Find the correlation between mid semester examination marks (x) and final examination marks (y). **07**

x	68	70	92	76	80	86
y	75	73	95	69	86	90

Q.4 **(a)** Define geometric mean and harmonic mean. **03**

(b) Calculate the arithmetic mean from the data given in the table. **04**

Number of Leaves	Number of plants
5	6
10	5
15	9
20	4
25	3
30	6
35	4
40	3

(c) The mean produce of wheat of a sample of 100 fields in 200 lbs. per acre with a standard deviation of 10 lbs. Another samples of 150 fields gives the mean of 220 lbs. with a standard deviation of 12 lbs. Can the two samples be considered to have been taken from the same population whose standard deviation is 11 lbs.? Use 5% level of significance. (R:| z| > 1.96) **07**

OR

Q.4 **(a)** What are the properties of t-test? **03**

(b) Raju Restaurant near the railway station at Falana has been having average has been having average sales of 500 tea cups per day. Because of the development of bus stand nearby, it expects to increase its sales. During the first 12 days after the start of the bus stand, the daily sales were as under: 550, 570, 490, 615, 505, 580, 570, 460, 600, 580, 530, 526 **04**

Test the hypothesis that there is a increase in sales.

(c) Test the effectiveness of Corona vaccine. **07**

	attacked	Not attcked
Vaccinated	80	220
Not vaccinated	120	580

Q.5 **(a)** Enlist the non-parametric tests. **03**

(b) What is Poisson's distribution? **04**

(c) Out of a sample of 120 persons in a village 76 were administered with new drug for preventing influenza and out of them 24 were attacked by influenza. Out of those who were not administered the new drug 12 were not affected by Influenza. Use Chi- square test to find the new drug was effective is not. **07**

OR

Q.5 Perform RBD to check the effectiveness of methods to treat corona infection as done by different Hospitals. **14**

Hospitals→	Fortys	Vokhardt	Apolo
Method 1	6	5	5
Method 2	7	5	4
Method 3	3	3	3
Method 4	8	7	4

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