

GUJARAT TECHNOLOGICAL UNIVERSITY**M.Sc Industrial Biotechnology/PG Diploma in Bioinformatics Semester - 1 Summer 2022
Examination****Subject Code:1310105****Date:13 Jul 2022****Subject Name:Statistics****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. Draw neat and clean diagrams as required

Q.1 Write a note on following**(Marks-
10X2=20)**

1. Describe Hypothesis and mention its types.
2. Define Confidence Interval.
3. Write the properties of Normal Distribution.
4. Write about the methods of sampling.
5. Mention the conditions required for applying t test.
6. During trials of a new drug, the patients were asked if they faced any side effects. A total of 15 patients participated in the study. What is the probability that 10 of the participated patients reported that they did not face any side effects?
7. Define Regression and Multiple Linear Regression.
8. Define Skewness and mention its types.
9. Define Ordinal and Nominal Data.
10. What are outliers in a data set. Explain with an example.

Q.2 Answer the following (Any 2 out of 3)**(Marks-
2X10=20)**

1. In a feline study, 8 cats were selected and their energy levels were recorded before and after providing them with a specific diet. The result of the study is represented in the tabulated form below.

No. of Cats	1	2	3	4	5	6	7	8
Energy Levels before diet	4	5	2	6	1	4	3	8
Energy Levels after diet	6	8	7	7	5	8	7	9

- A. Which test would you apply for the given data set?
 - B. Define Null and Alternate hypothesis for the study.
 - C. What is the level of significance used for the study and why?
 - D. Determine the Standard deviation for the data set.
2. In a random survey of 1050 students of class 6, the average height was found to be 146cm and the standard deviation (SD) was 8 cm. A histogram suggested the heights were normally distributed. Answer the following questions.
 - A. One of the students has a height of 170cm. The student is above average by _____SDs.

- B. Another student was 148 cm tall. The student was above average by ____SDs.
- C. If a student is within 2.25SDs of average height, the shortest he could've been is ___cm and the tallest he could've been is ___cm.
- D. Find the confidence interval for the data at 95% level of confidence. ($Z = 1.96$)
- E. Here are the heights of 5 students; 150cm, 130cm, 165cm, 140cm and 175cm. Which description fits the most for each student from the list below:
- Unusually Tall -About average
 - Unusually Short -Short
 - Tall

3. Consider Clinical Treatment for effectiveness of a new drug. If the drug is effective, the patients would feel pain relief as compared to untreated individuals. A total of 8 patients were enrolled in the study the values for before and after treatment were noted on a scale of 1 – 100. Increased scores indicate effectiveness of the drug. Determine if the drug has a significant effect on pain relief for the patients at significance level of 5% using Wilcoxon Signed Rank Test.

Patients	1	2	3	4	5	6	7	8
Before treatment	85	70	40	65	80	75	55	20
After treatment	75	50	50	40	20	65	40	25

Q.3 Answer the following (Any 6 out of 8)

(Marks-6X5=30)

1. Calculate Correlation Coefficient for the data:
X = 4, 8, 12, 16 and Y = 5, 10, 15, 20.
2. Define and explain in brief about:
 - A. Errors in Hypothesis Testing
 - B. One Tailed and Two-Tailed Testing
3. Write a note on p value giving an example
4. Explain the following terms:
 - A. Probability
 - B. Correlation
 - C. Discrete and Continuous data.
 - D. Mutually Exclusive Events
5. Describe the various methods for graphical representation of data.
6. Differentiate between Parametric and Non-Parametric Tests.
- 7 Write a note on the different types of Correlation.
- 8 Find Mean, Median, Mode, Standard Deviation and Standard error for the following data set.
2.8, 12.5, 6.4, 9.2, 6.5, 7.6

n	alpha values						
	0.001	0.005	0.01	0.025	0.05	0.10	0.20
5	--	--	--	--	--	0	2
6	--	--	--	--	0	2	3
7	--	--	--	0	2	3	5
8	--	--	0	2	3	5	8
9	--	0	1	3	5	8	10
10	--	1	3	5	8	10	14
11	0	3	5	8	10	13	17
12	1	5	7	10	13	17	21
13	2	7	9	13	17	21	26
14	4	9	12	17	21	25	31
15	6	12	15	20	25	30	36
16	8	15	19	25	29	35	42
17	11	19	23	29	34	41	48
18	14	23	27	34	40	47	55
19	18	27	32	39	46	53	62
20	21	32	37	45	52	60	69
21	25	37	42	51	58	67	77
22	30	42	48	57	65	75	86
23	35	48	54	64	73	83	94
24	40	54	61	72	81	91	104
25	45	60	68	79	89	100	113
26	51	67	75	87	98	110	124
27	57	74	83	96	107	119	134

n	alpha values						
	0.001	0.005	0.01	0.025	0.05	0.10	0.20
28	64	82	91	105	116	130	145
29	71	90	100	114	126	140	157
30	78	98	109	124	137	151	169
31	86	107	118	134	147	163	181
32	94	116	128	144	159	175	194
33	102	126	138	155	170	187	207
34	111	136	148	167	182	200	221
35	120	146	159	178	195	213	235
36	130	157	171	191	208	227	250
37	140	168	182	203	221	241	265
38	150	180	194	216	235	256	281
39	161	192	207	230	249	271	297
40	172	204	220	244	264	286	313
41	183	217	233	258	279	302	330
42	195	230	247	273	294	319	348
43	207	244	261	288	310	336	365
44	220	258	276	303	327	353	384
45	233	272	291	319	343	371	402
46	246	287	307	336	361	389	422
47	260	302	322	353	378	407	441
48	274	318	339	370	396	426	462
49	289	334	355	388	415	446	482
50	304	350	373	406	434	466	503
