

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2180403

Date: 29/11/2018

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. All the necessary charts are pasted with this question paper.
5. Notations used in this paper, carry conventional meaning.

MARKS

- Q.1**
- (a) Differentiate between histogram, pie chart, bat chart and map diagram. **03**
- (b) Distinguish between Mean, Median and Mode. **04**
- (c) The viable cell count for the *Acetobacter* (N) in a culture after t hours, is given by the following table : **07**

t	0	1	2	3	4	5	6
N	30	45	65	90	130	190	270

Fit a curve of the form $N = ab^t$ and estimate N when $t = 5.5$.

- Q.2**
- (a) Define : 1. Quartiles 2. Deciles 3. Quintiles. **03**
- (b) The frequency distribution of weight in grams of mangoes of a given variety is given below. Calculate the arithmetic mean and the median. **04**

Weight in grams	Number of mangoes
410-419	14
420-429	20
430-439	42
440-449	54
450-459	45
460-469	18
470-479	7

- (c) At an international student organization the president of organization expected that the students present should be 10 percent Africans, 25 percent Indians, 40 percent Asians and 25 percent Americans. The students actually present consisted of 25 Africans, 15 Indians, 80 Asians and 20 Americans. Test the president's belief at 5 percent level. **07**

OR

- (c) Find the coefficient of correlation between the variables X and Y using Karl Pearson's method: **07**

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

- Q.3 (a) What is inferential biostatistics and how is it different from descriptive biostat? 03
 (b) Calculate the mean from the following data: 04

Fish Length	90-99	80-89	70-79	60-69	50-59	40-49	30-39
In cms Frequency	2	12	22	20	14	4	1

- (c) Two samples A and B have means 2.158 and 1.96 respectively. Determine whether there is significant difference in means of sample A and sample B. 07

Sample A	2.5	2.1	1.9	2.4	1.8	2.6	2.5	2.3	0.9	1.7	2.2	2.0
Sample B	1.8	1.7	1.9	2.2	2.3	2.0	1.9	1.8	2.1	1.9	-	-

OR

- Q.3 (a) Write a note on: Importance of Biostatistics 03
 (b) The following table gives the age distribution of a group of 50 individuals. Calculate the coefficient of range in this group. 04

Age (in years) X	16-20	21-25	26-30	31-35
No of persons f	10	15	17	8

- (c) Body length of 10 fishes of a species of fish population was recorded from two ponds in the following table: 07

Pond	Body length of fishes in cm									
A	20	24	20	28	22	20	24	32	34	26
B	12	10	8	10	6	4	14	20	10	6

Calculate the mean difference in total body length between the fishes in the above two ponds is significant or not.

- Q.4 (a) Write a note on methods of least square. 03
 (b) Explain the type-I and type- II errors. 04
 (c) 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

- Q.4** (a) What is probable error? 03
 (b) Find the coefficient of rank correlation from the data given below showing the ranks of 10 students according to their performance in Microbiology and Statistics. 04

Rank in Microbiology	8	3	9	2	7	10	4	6	1	5
Rank in Statistics	9	5	10	1	8	7	3	4	2	6

- (c) In a sample survey of public opinion, two questions were asked: they were : (1) do you drink? (2) are you in favour of local opinion of sale of liquor? The answers of the survey is given in the local table. Is local opinion on the sale of liquor is dependent on the individual habit of drinking? 07

	Yes	No	Row Total
Yes	56	31	87
No	18	6	24
Column Total	74	37	111

- Q.5** A company appoints 4 salesmen observe the sales in 3 seasons. Carry put ANOVA to check the difference in sales due to salesman and seasons. The details are given below. 14

	SALESMEN			
Seasons	A	B	C	D
Summer	36	36	21	35
Winter	28	29	31	32
Monsoon	26	28	29	24

OR

- Q.5** The following data represent the numbers of unit of production per day turned out by 4 different workers using 5 different types of machines: 14

Worker	A	B	C	D	E
1	4	5	3	6	7
2	6	8	6	5	4
3	7	6	7	8	8
4	3	5	4	8	2

On the basis of this information, can it be concluded that

- (i) The productivity is the same for different machines?
 (ii) The workers do not differ with regard to productivity?

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

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 square 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