

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

B. Pharmacy Sem-II Examination June 2011

Subject code:220001 Subject Name: Applied Mathematics (Biostatistics)

Date: 18/06/11

Time: 10:30am-1:30pm

Total Marks: 80

### Instructions:

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q-1

(a) Explain the following terms. (any three) [06]

Null hypothesis, Standard error, Level of significance, Degrees of freedom, Contingency table

(b) Write in detail factors for designing clinical studies. [05]

(c) Find Karl Pearson's correlation co-efficient. [05]

Wage	100	101	102	102	100	99	97	98	96	95
Cost of living index	98	99	99	97	95	92	95	94	90	91

Q.2

(a) What do you mean by biostatistics? Explain its importance in Pharmacy. [06]

(b) Explain various techniques for sampling. [05]

(c) Two random samples are drawn from two normal populations and the following results are obtained. Using "F Test" determine whether the two populations have the same variance. ( $F_{tab}$  at 5 % level of significance = 2.9) [05]

Sample I	16	17	18	19	20	21	22	24	26	27	--	--
Sample II	19	22	23	25	26	28	29	30	31	32	35	36

Q.3

(a) Write a short note on regression coefficient. [06]

(b) Obtain line of regression of Y on X for the following data: [05]

Age (in years) X	66	38	56	42	72	36	63	47	55	45
Blood pressure Y	145	124	147	125	160	118	149	128	150	124

Estimate the blood pressure of a man whose age is 50 years.

(c) The following information is obtained for two variables x and y. find regression equation of y on x.  $n=10$ ;  $\sum x= 130$ ,  $\sum y= 220$ ,  $\sum x^2= 2288$ ;  $\sum xy= 3467$ . [05]

Q.4

(a) Explain in detail Rank test. [06]

(b) In order to compare the effectiveness of two sunburn lotions, a random sample of seven subjects is selected. Lotion A is applied to the left side of their faces and lotion B to the right side. After the subjects have sat in the sun watching a three-hour tennis match, the degree of sunburn is measured on a scale. [05]

Subject	1	2	3	4	5	6	7
Lotion A	48	62	42	69	74	35	84
Lotion B	46	49	48	63	43	32	53

Apply Wilcoxon signed rank test, determine whether the data support the claim that the two lotions are equally effective.

- (C) An agency conducting weight reduction programme claims that participants in their programme achieve weight reduction of at least 5 kg after two weeks of the programme. In evidence, they have given the following data, on 10 participants who have undergone this programme. On the basis of this sample evidence, can the claim of the agency on weight reduction be said to be valid? ( $t_{\text{tab}}$  at 5 % level of significance = 2.26) [05]

Before (kg)	86	92	100	93	88	80	88	92	95	106
After (kg)	77	84	82	87	80	74	80	85	95	96

Q.5

- (a) Write a short note on Chi-square test. [06]  
 (b) In a experiment on immunization of cattle from tuberculosis, the following results were obtained: [05]

	Affected	unaffected
Inoculated	12	28
Not inoculated	13	7

Examine with help of chi-square test the effect of vaccine in controlling the incidence of disease. ( $\chi^2_{\text{tab}}$  at 5 % level of significance = 3.84)

- (C) A die is thrown 150 times and the following results were obtained. [05]

Number turned up	1	2	3	4	5	6
Frequency	19	23	28	17	32	31

Test the hypothesis that die is unbiased at 5% level of significance ( $\chi^2_{\text{tab}}$  at 5 % level of significance = 11.1).

Q.6

- (a) Write a short note on Different types of ANOVA. [06]  
 (b) The Following are the results of assays comparing three analytical methods: [05]

Method A	Method B	Method C
100	100	101
102	99	100
99	101	101
104	98	102
101	98	100

Test at 5 % level of significance the null hypothesis that there are no significant differences among the three methods. ( $F_{\text{tab}} = 3.88$ )

- (C) A random sample of 20 tablets from a batch gives a mean ingredient content 42 mg and standard deviation of 6 mg. test the hypothesis that the population mean is 44 mg ( $t_{\text{tab}}$  at 5 % level of significance = 2.093). [5]

Q.7

- (a) Write a note on correlation coefficient. [6]  
 (b) The sale and expenditure of 10 companies are given below. Find co-efficient of correlation between sale and expenditure. [5]

Sale	50	55	55	60	65	65	65	60	60	50
Expenditure	11	13	14	16	16	15	15	14	13	13

- (C) Blood glucose level of pigeons is compared with rabbits. Apply proper statistical test to know the significance of difference of blood glucose levels of the two using the following data and comment your result. ( $t_{\text{tab}}$  at 5 % level of significance = 2.101) [5]

Sr. No.	1	2	3	4	5	6	7	8	9	10
Pigeons (Blood glucose)	200	186	176	184	170	172	170	163	176	173
Rabbits (Blood glucose)	145	125	100	112	127	139	151	140	159	132

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