Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.PHARM- SEM-II–EXAMINATION – JUNE 2012

Subject code: 220001 Date: 12/06/2012

Subject Name: Applied Mathematics (Biostatistics)

Time: 10:30 am – 01:30 pm 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) Discuss various sampling techniques in detail. **06**

(b) Suppose a population consists of five analytical laboratories A, B, C, D and E analyzing a 3, 2, 6, 5 and 4 thousands units per month of drug formulations respectively. Draw all possible samples of size two and find the sample mean and standard error for every sample. **05**

(c) Write a note on variance ratio test with pharmaceutical applications. **05**

Q.2 (a) Explain the terms related to testing of hypothesis: **06**
1. Level of significance 2. Degree of freedom 3. Critical region

(b) Explain: regression. Write difference between regression and correlation. **05**

(c) The table represents the percent purity of drug from different suppliers: **05**

Supplier A	100	97	98	97	94	98
Supplier B	89	99	94	99	92	96

State whether the variation is significant or not in drug product by the supplier.
F value (5, 5) at 5% level of significance = 5.050

Q.3 (a) Explain correlation, types of correlation, and methods of studying correlation. **06**

(b) Enumerate the various experimental designs in clinical trials and explain any one in detail. **05**

(c) Discuss Null hypothesis, Alternate hypothesis with types of error in test of hypothesis. **05**

Q.4 (a) The following table shows the weights (X) and assay (Y) of 10 tablets. Find the lines of regression of Y on X and X on Y. Calculate correlation coefficient between X and Y. **06**

Weight	190	200	194	201	203	197	205	207	203	210
Assay	95	100	99	101	100	98	101	102	101	103

(b) Explain: Wash out period and carry over effect. **05**

(c) Discuss: Wilcoxon signed rank test and The Krushal – Wallis Test. **05**

Q.5 (a) The table shows data of results of drug content obtained from analytical method A and method B. **06**

Method A	55	66	46	77	57	59	70	57	52	36
Method B	90	117	94	124	105	115	125	97	97	78

Conclude there is a significant relationship between method A and method B.
$t_{tab}(9, 0.05) = 2.262$

(b) Write a note on procedure for analysis of variance for two way classification. **05**

(c) Enlist various types of non- parametric test. Discuss advantages and disadvantages of non-parametric test. **05**

Q. 6 (a) A known sample is analyzed using each three methods of analysis and following results found: **06**

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

Conclude about significant difference among methods of analysis at 5 % level of significance. $F_{tab}(2,12) = 3.88$

(b) In a sample of 120 persons, 76 persons were administered with new drug for prevention of disease. Out of whom 24 persons were attacked by disease. Amongst those not administered the new drug 12 persons were not affected by disease. Using Chi square test find out whether the new drug is effective? **05**
Given for 1 degree of freedom $\chi 2$ at 0.05 level = 3.841

(c) What is population and Sample? Discuss objectives of sampling. Explain characteristics of good sample with merits and demerits of sample. **05**

Q.7 (a) The table shows data of score of six analysts before and after they were trained for sophisticated analytical instruments. **06**

Sr. No	Score before training	Score after training
1	12.2	13.0
2	11.3	13.4
3	14.7	16.0
4	11.4	13.6
5	11.5	14.0
6	12.7	13.8

Test whether there is change in score after training program.
t_{tab} (5, 0.05) = 2.571

(b) The pH values of six buffer solutions measured with two models of pH meters, pH meter A and pH meter B. The table shows measured pH values. **05**

Buffer solution	pH using pH meter A	pH using pH meter B
1	3.78	3.98
2	4.01	4.12
3	6.87	7.01
4	7.41	7.34
5	9.18	9.12
6	10.01	10.2
Mean	6.877	6.962
Standard Deviation	2.5774	2.5399

Using a 0.05 significance level, determine whether the two models of pH meters show different pH. t_{tab} (10, 0.05) = 2.228

(c) A random sample of 10 tablets of diclofenac drug from a batch gives drug content as given below: **05**

48 36 43 38 43 33 47 46 43 53

Test the hypothesis that the population mean is 43 mg. t_{tab} (9, 0.05) = 2.262

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