

GUJARAT TECHNOLOGICAL UNIVERSITY
BPHARM – SEMESTER II • EXAMINATION – SUMMER • 2014

Subject code: 220001

Date: 26-05-2014

Subject Name: Applied Mathematics (Biostatistics)

Time: 02:30 pm - 05:30 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) Explain sampling methods in detail. **06**
 (b) Define: Standard error, Sampling distribution, Biostatistica **03**
 (c) Differentiate: Sampling With Replacement and Without Replacement. **02**
 (d) A population consists of 400 units. Suppose a systemic sample of 10 items is to be selected from this population. Explain the procedure of selecting the sample. **05**

- Q.2** (a) Define correlation. Discuss the types of correlation. Explain coefficient of correlation. **06**
 (b) Explain scatter diagram and karl pearson's product moment method of correlation. **05**
 (c) Ten industries of the state have been ranked according to the profit earned in 2000-2001 and the working capital for the year. Calculate the rank correlation coefficient. **05**

Industry	A	B	C	D	E	F	G	H	I	J
Rank (Profit)	1	2	3	4	5	6	7	8	9	10
Rank (Working capital)	7	10	8	9	4	5	2	6	1	3

- Q.3** (a) Define ANOVA. Explain the procedure of analysis of variance with two way classification. **06**
 (b) Using the data given below, find the equation of the two lines of regression. **05**

Variable	Mean	S.d	Coeff. of correlation
X	40	5	$r = 0.8$
Y	30	4	

- (c) 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

State whether the variation is significant or not in analytical methods. F value (2, 12) at 5% level of significance = 3.88.

- Q.4** (a) Write note on the followings **06**
 (1) Wilcoxon signed rank test (2) Kruskal wallis test
 (b) What are the merits and demerits of non parametric tests. **05**
 (c) Differentiate between crossover and parallel design. What do you mean by carry over effect in bioequivalence study? **05**

- Q.5** (a) Explain Chi-Square test. **06**
 (b) Define: Null hypothesis, Critical region, Regression, Line of regression, Level of significance. **05**

- (c) Measurement of body mass index(BMI) for a sample of 10 healthy adult males are shown in the following table. **05**

Subject	1	2	3	4	5	6	7	8	9	10
BMI	21	23	32	24	47	22	45	37	24	35

On the basis of these data can we conclude that the mean BMI of the population from the sample was drawn is 35? $T_{\text{tab}}(9,0.05) = 2.262$

- Q. 6** (a) Explain following terms with reference to experimental designs in clinical trials. (1) Wash out period (2) Replicate design **06**

- (b) The following table represents the acceptance yield of six lots of 100 samples received from two different suppliers. **05**

A1	98	94	97	98	97	100
A2	89	99	94	99	92	96

The critical value of Fisher's statistic (F_{critical}) is 5.05. State whether the product variance caused by the treatment (supplier) is significant or not significant. F value (5,5) at 5% level of significance =5.050

- (c) In an experiment on immunization of cattle from tuberculosis, the following results were obtained: **05**

	Affected	Unaffected
Inoculated	12	28
Not inoculated	13	7

Examine the effect of the vaccine in controlling the incidence of disease. ($\chi^2_{1,0.05}$) =3.84

- Q. 7** (a) Differentiate between: (1) Sample & Population (2) One tail & Two tail test **06**

- (b) The following table shows the yields per acre of four different types of a crop grown on lots treated with three different types of fertilisers. Determine at the 5% level of significance whether there is a significant difference in yields per acre (i) due to fertilisers (ii) due to the types of the crop. **05**

	Crop I	Crop II	Crop III	Crop IV
Fertilizer A	6	4	8	6
Fertilizer B	7	6	6	9
Fertilizer C	8	5	10	9

F value (2,6) at 5% level of significance = 5.14.

- (c) Explain degree of freedom in testing of hypothesis. **03**
 (d) Join the particular test with the name of scientist. **02**

Test	Derived by Scientist
T-test	Karl Pearson
ANOVA	Sir Francis Galton
Chi-Square	W.S.Gosset
Regression	R.A.Fisher
