

# UKA TARSADIA UNIVERSITY

B.Pharm. (2nd Semester)

Subject : 030020205-Biostatistics

Time : 10 am to 1 pm

Duration : 3 Hours

Date : 30/05/2014

Max. Marks : 70.

## Instructions:

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Figures to the right indicate full marks allocated to that question.
5. Draw diagrams/figures whenever necessary.

## SECTION - 1

### Q-1 (A) Do as directed.

[07]

- I) Define Data.
- II) What is population?
- III) Write the Formula of t-test for correlation coefficient.
- IV) Define Alternative hypothesis.
- V) What is diagram?
- VI) What do you understand by Multistage Sampling?
- VII) What do you understand by the size of the sample?

### Q-1 (B) Answer the following in brief. (Any 4)

[08]

- I) What is Systematic Sampling?
- II) Write the difference between Population and Sample.
- III) Define Critical Region.
- IV) Write the advantages of nonparametric test.
- V) If  $\bar{x}_1 = 7.52, \bar{x}_2 = 7.49, s = 0.0278, n_1 = 6, n_2 = 5$ ; then find t calculate value for two mean.
- VI) When is Mann-Whitney U test used?

### Q-2 Answer the following.

[10]

- A) Explain briefly Wilcoxon signed-rank test.

## OR

- A) Explain Krushal- Wallis H test with the help of an examples.
- B) A population consists of five numbers 2, 3, 6, 8, 11. Consider all possible size of two which can be drawn with replacement from this population. Calculate the standard error of sample mean.

## OR

- B) 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. ( $t_{Tab} = 2.093$ )

### Q-3 Answer the following. (Any 2)

[10]

- A) An I.Q. test was administered to 5 medical representatives before and after they were trained. The results are given below:

Candidate No.	1	2	3	4	5
I.Q. before training	110	120	123	132	125
I.Q. after training	120	118	125	136	127

Test whether there is any change in I.Q. after the training programme. ( $t_{Tab} = 2.776$ )

- B) Two random samples drawn from the two normal populations are

Sample I	24	27	26	21	25	
Sample II	27	30	32	36	28	23

Obtain the estimates of the variance of population and test the two populations have the same variance. ( $F_T = 6.39$ ).

- C) The following table shows the results of an experiment to investigate the effect of vaccination induced on the animals against a particular disease. Use the Chi-square test to test the hypothesis that there is no difference between the vaccinated and unvaccinated groups i.e. vaccination and this disease are independent.

	Got Disease	Did not get Disease
Vaccinated	9	42
Not Vaccinated	17	28

( $\chi^2_{tab} = 3.84$ )

## SECTION - 2

### Q-4 (A) Do as directed.

[07]

- I) What is Design?
- II) What do you understand by the term “choice of patient”?
- III) Write the formula of Y on X.
- IV) Define Positive correlation
- V) What is the formula of Spearman’s Rank correlation?
- VI) When  $n, \sum x, \sum y, \sum x^2, \sum y^2$  and  $\sum xy$  are given then  $b_{yx} = ?$
- VII) What is correlation?

### Q-4 (B) Answer the following in brief. (Any 4)

[08]

- I) What are the general principles that should be considered in the conduct of clinical trials?
- II) What is regression? Why we use in general two regression lines?
- III) Write a short note on Measurement Scales.
- IV) The following values are available for the variables  $x$  and  $y$ :  
 $n = 10, \sum x = 30, \sum y = 40, \sum x^2 = 222, \sum y^2 = 985, \sum xy = 384$ . Then obtain the regression equation  $y$  on  $x$ .
- V) What is R-chart?
- VI) Two judges in a beauty contest rank the 12 contestants as follows:

X	1	2	3	4	5	6	7	8	9	10	11	12
y	12	19	6	10	3	5	4	7	8	2	11	1

What degree of agreement is there between the judges?

### Q-5 Answer the following.

[10]

- A) Find the regression equation showing the capacity utilization on production from the following data:

	Average	Standard Deviation
Production (in lakh units)	35.6	10.5
Capacity utilization (in %)	84.8	8.5
Correlation coefficient $r = 0.62$		

Estimate the production when the capacity utilization is 70 %.

## OR

- A) Nine students secured the following percentage of marks in mathematics and chemistry.

Roll No.	1	2	3	4	5	6	7	8	9
Marks in Mathematics	78	36	98	25	75	82	90	62	65
Marks in Chemistry	84	51	91	60	68	62	86	58	53

Find the rank correlation coefficient by Spearman’s Rank Method

B) What is Parallel Design? Explain the Key point in this Design.

**OR**

B) What are the Merits and Demerits of Cross over design?

**Q-6 Answer the following. (Any 2)**

**[10]**

A) During laboratory experiment muscular contractors of frog muscle were measured against different doses of a given drug. The height of the curve was considered as the response to the drug. Calculate the correlation coefficient for the following data.

Serial no.	1	2	3	4	5
Dose of the drug	0.3	0.4	0.6	0.8	0.9
Response to the drug	54	59	60	65	70

B) The number of bacterial cells (X) per unit volume in a culture at different hours (Y) is given below.

X	0	1	2	3	4	5	6	7	8	9
Y	43	46	82	98	123	167	199	213	245	272

Fit a line of regression of Y on X and estimate the number of bacterial cells after 12 hours.

C) The determination of maximum plasma concentration of drugs in  $\mu g/ml$  at three different formulations. A, B and C was the subject of a recent experiment. Four different subjects chosen at random from a group were used for this purpose. The data are shown below

Subject	A	B	C
1	12	16	30
2	5	10	18
3	7	28	35
4	10	26	51

Carry out a two-way ANOVA for (a) There is no significant different between subjects ( $F_T = 4.76$ ) and (b) There is no significant different between maximum plasma concentration of different formulations ( $F_T = 5.14$ ).