

UKA TARSADIA UNIVERSITY

B. Pharm. (2nd Semester)

Subject : 030020205-Biostatistics

Duration : 3 Hours

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) What is systematic sampling?
- II) Define : Data Organization
- III) Explain : Alternate Hypothesis
- IV) Enlist two methods of simple random sampling
- V) What is Kruskal – Wallis test?
- VI) Define : Statistical Hypothesis
- VII) Explain : 3D Diagram

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

[08]

- I) What is chi – square test? Under what condition it is applicable?
- II) List out advantages of non-parametric tests.
- III) Explain the procedure of stratified random sampling.
- IV) What is difference between Graph and Diagram?
- V) Explain in brief large sample test and small sample test.
- VI) What are the rules for constructing diagram?

Q-2 Answer the following.

[10]

- A) Two types of chemical solution A and B were tested for their pH degree of acidity of the solution. Analysis of six samples of A showed a mean pH of 7.52 with a standard deviation of 0.024. Analysis of five samples of B showed a mean pH of 7.49 with standard deviation of 0.032. Using a 0.05 significance level, determine whether the two types of solution have different pH values. ($t_{9,0.05} = 2.262$)

OR

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

Sample 1	24	26	27	21	25	
Sample 2	27	30	32	36	28	23

Obtain the estimates of the variance of the populations and test if the two populations have same variance given that $f_{0.05} = 5.19$ for (4,5) d.f.

- B) A sample of 200 persons with a particular disease was selected. Out of these, 100 were given a drug and the others were not given any drug. The results are as follows.

	Drug	No drug
Cured	65	55
Not cured	35	45
Total	100	100

Test, whether the drug is effective or not apply χ^2 test.

OR

- B) In test a given two groups of students, the marks obtained are as follows

Group-I	18	20	36	50	49	36	34	49	41
Group-II	29	28	26	35	30	44	46		

Examine the significance of the difference between the arithmetic mean of the marks.

Q-3 Answer the following in detail. (Any 2)

[10]

- A) A sign test of the effectiveness of a safety program. The following are the average weekly losses of worker –hours due to accidents in the industrial plants before and after a certain safety program were put into operation.

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Use the sign test at the 0.05 level of significance to the test whether the safety program is effective.

- B) Calculate the rank correction coefficient for the following data of 2 tests given to candidates for a clerical job.

Preliminary test	92	89	87	86	83	77	71	63	53	50
Final test	86	83	91	77	68	85	52	82	37	57

- C) The observations of populations are 6, 8, 12, 16, 20, 22. How many different samples of size 2 without replacement can be taken from it? Preparing a list of the samples, verify the following results.

1) $E(\bar{y}) = \bar{Y}$ 2) $E(s^2) = s^2$ 3) $V(\bar{y}) = \left(\frac{N-n}{N}\right) \frac{s^2}{n}$

SECTION - 2

Q-4 (A) Do as directed.

[07]

- I) What are lines of Regression?
- II) Define : Negative correlation
- III) Define: Carry Over Effect.
- IV) Define: Wash-out Period.
- V) List our different experimental designs used in clinical research
- VI) Explain : Analysis of Variance
- VII) What is X – Chart?

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

[08]

- I) Define : Coefficient of Correlation
- II) What are the advantages of two – way cross – over?
- III) Explain in brief C – Chart.
- IV) What are the limitations of Statistical Quality Control?
- V) Explain Spearman's rank correlation method in detail.
- VI) Explain analysis of variance for one – way classification with example.

Q-5 Answer the following.

[10]

- A) Following table gives the indices of industrial production of register unemployed (in 100,000). Calculate the values of coefficient of correlation.

Year	2004	2005	2006	2007	2008	2009	2010	2011
Index of Production	100	102	104	107	105	112	103	99
No. of Unemployed	15	12	13	11	12	12	19	26

OR

- A) What is crossover design? Discuss merits and demerits of the crossover design.
- B) Ten workers were given on the job training with a view to shorten their assembly time for a certain mechanism. The results of the time and motion studies before and after the training program are given below:

Worker	1	2	3	4	5	6	7	8	9	10
Before	61	62	55	62	59	74	62	57	64	62
After	59	63	52	54	59	70	67	65	59	71

Is there evidence that the training program has shortened the average assembly time? Using Wilcoxon Signed ranked test.

OR

- B) A study investigated the perception of corporate ethical values among individual specializing in marketing. Using One-way Anova test and the following data higher scores indicate higher ethical values, test for 5 percent level of significant differences in perception among three groups.

Marketing Manager	Marketing Manager	Advertising
6	5	5
5	5	7
4	4	6
5	4	5
6	5	6
4	4	6

Q-6 Answer the following in detail. (Any 2)

[10]

- A) Enumerate the experimental designs in clinical trials. Discuss in details about any one experimental design.
- B) The following are the average weekly losses of worker- hours due to accidents in 10 industrial plants before and after a certain safety program were put into operation.

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Use the sign test at the 0.05 level of significance to test whether the safety program is effective.

- C) To study the performance of three detergent and three different water temperatures the following whiteness readings were obtained with specially designed equipment:

Water Temperature	Detergent A	Detergent B	Detergent C
Cold Water	57	55	67
Warm Water	49	52	68
Hot Water	54	46	58

Perform a two-way analysis of variance, using 5 percent level of significance.