Roll Number ---------- **(Total Number of Questions 13)** **(Total number of Printed Pages 04)**

Programme	B. Pharmacy
Semester	8th
Subject	Biostatistics and Research Methodology
Subject Code	BP801T
Paper ID	79764
Time	3Hours
Maximum Marks	75

Instructions to Candidates: *No supplementary/continuation sheet will be issued to the candidates. Answer the questions precisely.*

Section A consists of Ten parts of 2 marks each (Objective Type); Attempt **ALL.*

***Section B consists of Three questions carrying 10 marks each (Long Answer); attempt any **TWO**.*

**** Section C consists of Nine questions carrying 5 marks each (Short Answer); attempt any **SEVEN**.*

Section A **(10 X2 = 20)**

1. Give very short answers to the followings (2 marks each):

i.	Define Central tendency.
ii.	What is the motivation in research?
iii.	Using Poisson distribution, find the probability that aces of spades will be drawn from a pack of well shuffled cards at least once in 104 trials. (e^{-2}=0.1353)
iv.	Define SPSS system.
v.	What do you mean by Cohort studies?
vi.	What is Bar graph and Pie chart?
vii.	Enlist important experimental designs.
viii.	Define the term "Protocol".
ix.	Define Karl Pearson's coefficient of correlation.
x.	Explain mathematical expression of SEM.

Section B **(2 X 10 = 20)**

2.	What is ANOVA? Explain its one-way technique.
3.	a. From the following data test the hypothesis using Wilcoxan matched pairs test ($t_{5\%}$=25) Brand A= 73 43 47 53 58 47 52 58 38 61 56 56 34 55 65 75 Brand B= 51 41 43 41 47 32 24 58 43 53 52 57 44 57 40 68 b. Explain in brief "Report writing".
4.	Discuss the Experimental design techniques in brief.

Section C **(7 X 5 = 35)**

5.	Describe in detail plagiarism with plagiarism detecting software.
6.	Explain hypothesis and its types.
7.	What is response surface methodology? Mention its various designs.
8.	By the method of least squares, find the straight line that best fits the following data: X = 1 2 3 4 5 Y= 14 13 9 5 2
9.	What is the goal of a factorial design? Explain two square factorial design.
10.	Write a note on Minitab.
11.	A pair of dice thrown 10 times. If getting a doublet (same no. on both) is considered as a success, find the probability of (a) no success (b) 3 successes
12.	Elaborate basics of observational studies.
13.	Write the procedure for t-test.

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170523 (Evening)

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**** Section C consists of Nine questions carrying 5 marks each (Short Answer); attempt any **SEVEN**.*

Section- A (10 X2 = 20)

1.	Give very short answers to the followings
i.	What are advantages of non-parametric tests?
ii.	Define probability.
iii.	Differentiate Null hypothesis and alternate hypothesis.
iv.	What is meant by counter plot graph?
v.	Write various phases of clinical trials.
vi.	Describe various types of sampling.
vii.	What are limitations of range?
viii.	Mention various optimization techniques.
ix.	Write various assumptions of analysis of variance (ANOVA)?
x.	Define standard error of regression.

Section- B (2 X 10 = 20)

2.	Explain in detail factorial design and advantages of factorial design.
3.	Describe Cohorts studies, Observational studies and Experimental studies in designing methodology along with examples.
4.	Discuss Response Surface Methodology. Mention various Optimization techniques.

Section- C (7 X 5 = 35)

5.	Discuss various methods of measuring central tendencies.
6.	Describe Wilcoxon Rank Sum Test and Mann-Whitney U test.
7.	Define Normal distribution. Write properties of normal distribution.
8.	Mention various types of graphs.
9.	Discuss briefly blocking and confounding system for Two-level factorials.
10.	Elaborate Online Statistical Software's to Industrial and Clinical trial approach.
11.	What is procedure of hypothesis testing?
12.	Explain the significance of a research report and narrate the various steps involved in writing a report.
13.	Discuss unpaired and paired t-test.

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200524 (Evening)

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Subject Code	BP801T
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***Section B consists of Three questions carrying 10 marks each (Long Answer); attempt any **TWO**.*

****Section C consists of Nine questions carrying 5 marks each (Short Answer); attempt any **SEVEN**.*

Section- A **(10 X2 = 20)**

1.	Give a very short answers to the followings:
i.	Mention two software programs used to test for plagiarism.
ii.	Discuss the need for designing experiments.
iii.	Describe the standard error of the mean.
iv.	What are the various types of sampling?
v.	State the basic principle of ANOVA.
vi.	Describe the Kruskal-Wallis non-parametric test.
vii.	What are the techniques for constructing graphs?
viii.	Write down the various experimental designs.
ix.	What is the various software programs used in designing experiments in your field?
x.	Differentiate between the null hypothesis and the alternate hypothesis.

Section- B **(2 X 10 = 20)**

2.	Describe in detail the various non-parametric tests. Narrate the various advantages of using non-parametric tests.
3.	Discuss Karl Pearson's coefficient of correlation and multiple correlations.
4.	What is a hypothesis? Draw a flow diagram for hypothesis testing. Discuss hypothesis testing in simple and multiple regression models.

Section- C **(7 X 5 = 35)**

5.	Explain the curve fitting method of least squares.
6.	Describe Type I and Type II errors.
7.	Discuss various measures of central tendency.
8.	Narrate the various phases of clinical trials.
9.	Describe observational and experimental studies.
10.	Explain the meaning of analysis of variance. Describe briefly the techniques of analysis of variance for one-way and two-way classification.
11.	Describe various statistical software programs for industrial and clinical trial approaches.
12.	How do you use response surface methodology for optimization?
13.	Discuss 2x2 and 2x3 factorial designs.

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111224

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Subject Code	BP801T
Paper ID	79764
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Section- A **(10 X2 = 20)**

1.	Give very short answers to the followings
i.	What are advantages of non-parametric tests?
ii.	Define Karl Pearson's coefficient of correlation.
iii.	Differentiate null hypothesis and alternate hypothesis.
iv.	What is meant by counter plot graph?
v.	Write various phases of clinical trials.
vi.	What is the motivation in research?
vii.	What are limitations of range?
viii.	Mention various optimization techniques.
ix.	Using poisson distribution, find the probability that aces of spades will be drawn from a pack of well shuffled cards at least once in 104 trials.(e^{-2}=0.1353)
x.	Define standard error of regression.

Section- B **(2 X 10 = 20)**

2.	Explain in detail factorial design and advantages of factorial design.
3.	Describe cohort's studies, observational studies and experimental studies in designing methodology along with examples.
4.	What is ANOVA? Explain its one-way technique.

Section- C **(7 X 5 = 35)**

5.	Discuss various methods of measuring central tendencies.
6.	Describe in detail plagiarism with plagiarism detecting software.
7.	Write a note on Friedman test.
8.	By the method of least squares, find the straight line that best fits the following data: X = 1 2 3 4 5 Y= 14 13 9 5 2
9.	Discuss briefly blocking and confounding system for two-level factorials.
10.	Explain central composite design.
11.	What is procedure of hypothesis testing?
12.	Explain the significance of a research report and narrate the various steps involved in writing a report.
13.	Discuss unpaired and paired t-test.

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(Evening)
04 06 25

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***Section- B consists of Three questions carrying 10 marks each (Long Answer); attempt any TWO.*
****Section -C consists of Nine questions carrying 5 marks each (Short Answer); attempt any SEVEN.*

Section- A (10X2=20)

1.	Give very short answers to the followings:
i.	Define probability.
ii.	What is a null hypothesis?
iii.	Why is research necessary?
iv.	Enumerate the different types of optimization techniques used in response surface methodology.
v.	Define range.
vi.	What do you mean by quartile deviation?
vii.	Give a suitable example of a screening design.
viii.	What is the Friedman test?
ix.	The standard deviation of the tablet weight is 1.5 mg. Calculate its variance.
x.	What is plagiarism in research?

Section- B (2X10=20)

2.	Derive the Spearman rank correlation coefficient and discuss it in detail.
3.	What are the broad categories of research? Explain the cohort study with an example.
4.	Explain the importance of the ANOVA test in statistical research.

Section- C (7X5=35)

5.	What do you mean by Type I errors?
6.	Discuss various measures of central tendency.
7.	Calculate the SD and %RSD of the following data: 10.12, 14, 18.25, 30, 35, 21, and 40.
8.	Differentiate between paired and unpaired tests.
9.	Explain the principle and application of the Mann–Whitney test.
10.	What do you mean by central composite design?
11.	Illustrate the various steps of report writing.
12.	Discuss the applications of the MINITAB program in statistical analysis.
13.	Explain any three measures of dispersion with examples.

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**** Section -C consists of Nine questions carrying 5 marks each (Short Answer); attempt any SEVEN.*

Section- A (10 X2 = 20)

1.	Give very short answers to the followings
i.	State the basic assumptions required for conducting ANOVA.
ii.	What is the standard error of regression?
iii.	List different phases involved in clinical trials.
iv.	Give the advantages of using non-parametric statistical tests.
v.	What is a contour plot?
vi.	Define probability.
vii.	What limitations are associated with the range as a measure of dispersion?
viii.	Give types of sampling methods commonly used in research.
ix.	Mention important optimization techniques applied in statistics.
x.	Distinguish between a null hypothesis and an alternative hypothesis.

Section- B (2 X 10 = 20)

2.	Describe the concept of Response Surface Methodology and outline major optimization approaches.
3.	Discuss factorial design and highlight the advantages of using factorial experiments.
4.	Explain Cohort studies, Observational studies, and Experimental study designs with suitable examples.

Section- C (7 X 5 = 35)

5.	Outline the various methods used to measure central tendency.
6.	Write a note on the Wilcoxon Rank Sum Test and the Mann–Whitney U Test.
7.	Define the normal distribution and list its essential properties.
8.	Enumerate different types of graphical representations used in data analysis.
9.	Briefly describe blocking and confounding in two-level factorial designs.
10.	Summarize the use of online statistical tools in industrial applications and clinical research.
11.	Present the general procedure involved in hypothesis testing.
12.	Explain the importance of a research report and list the steps in report writing.
13.	Differentiate between paired and unpaired t-tests.

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