#### Visva-Bharati

# Palli Siksha Bhavana (Institute of Agriculture) Department of Agricultural Statistics Ph.D. Course Work Examination 2024

Course Name: Research Methodology and Techniques

Course No.: STAT 601(Course 1)

Time: 3 hours

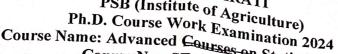
Full Marks: 80

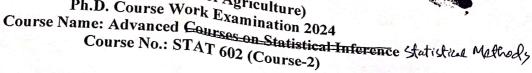
Time: 3 hours	Full Warks: 60
Questions are of value as indicated in th	e margin
Answer any five questions	
1. /a. Define 'research design' and explain the use of a reso	arch design in conducting 16
research.	
b. State the criteria of a good research design. Explain the	e deductive and inductive
procedures of research.	
2. a. When a research would be called	16
(i) Explanatory research (ii) Exploratory research (iii) Des	criptive research
b Describe different criteria for selecting a research proble	m.
_3. State different ways of collecting primary data. What is	the difference between 'a 16
questionnaire' and 'a schedule'? State when a question in	questioner is called (i) a
loaded question (ii) a double-barreled question	
-4. State different scales of measurements. Arrange the measurements.	ement scales in weakest to 16
strongest order. State one variable measured in (i) nominal	scale (ii) Interval Scale.
5. Describe Meta analysis in the Context of repeated survey of	the same subject. 16
6. Describe an outlier observation. Why it is important to identify	outlier observations in a data 16
set? Discuss different ways to identify outlier observations.	
7. State when cluster sampling is useful. Write down the differen	ce between cluster sampling 16
and stratified random sampling. What is the difference between	
stratified random sampling and 'a cluster' in the context of cluster	r sampling?
8. Write short notes on any two of the following:	
(a) Runs test for randomness	
(b) Sample Survey v/s Complete enumeration	
(c) Probability and Nonprobability samplings	

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### VISVA-BHARATI

## PSB (Institute of Agriculture)





Time: 3 hours

Questions are of value as indicated in the margin

Answer five questions

Explain statistical inference and state three important properties of point estimator, Find the method of moment estimator of parameter  $\lambda$  in the Poisson distribution

2. For the random variable having density function  $f(x) = 1/\theta$ ,  $0 < x < \theta$ 

find the m.l.e. of  $\theta$  on the basis of a random sample x1,x2,...,xn drawn from f(x),

where the sample observations are 6.2, 5.7, 5.5, 6.3, 6.4, 5.8, 5.9(6.6)6.0, 5.6

16

Full Marks: 80

Let  $x_1$ ,  $x_2$ ,  $x_3$ ,  $x_4$  be a random sample of size 4 from a normal population with mean  $\mu$  and variance  $\sigma^2.$  Let  $t_1$  and  $t_2$  be the estimators of  $\;\mu$  given by

$$T_1 = \frac{1}{4}(x_1 + x_2 + x_3 + x_4)$$
  $T_2 = \frac{1}{10}(x_1 + 2x_2 + 3x_3 + 4x_4)$ 

Find

- (i) Is T<sub>1</sub> unbiased?
- (ii) Is T2 unbiased?
- (iii) Find the variance of  $T_1$  and  $T_2$
- (iv) Compare the efficiency of  $T_1$  and  $T_2$

16

Explain the concept of errors in testing of hypothesis and power of a test. State the steps involved in a nonparametric statistical test.

- 5. A sample analysis of examination results of 200 M.Sc. (Ag) students was made. It was found that 15 students had failed, 48 secured a third division, 55 secured a second division and the rest were placed in first division. Test at 5% level of significance whether these figures commensurate with the general examination result which is in the ratio of 1: 2: 3: 4 for the various categories respectively. 16
  - 6. The heights of six randomly chosen plants from unsprayed strips are in inches 43, 45, 48, 49, 51 and 52. Those of ten randomly chosen plants from sprayed strips are in inches 47, 49, 49, 51, 53, 54, 55, 55, 56, 57. Test whether spraying exercises have any effect on the heights of plants. 16

Show that sample mean is a consistent estimator of the population mean in normal population

16

Explain any two of the terms

16

- (a) Test for randomness
- (b) 2×2 contingency table
- (c) FCR inequality

X~N(4,%)

VISVA-BHARATI
PSB (Institute of Agriculture)
Ph.D. Course Work Examination 2024 Course Name: Reviewing of Published Research Work and presentation of Synopsis Course No.: STAT 603 (Course-3)

Time: 3 hours

Full Marks: 80

Questions are of value as indicated in the margin

#### Answer the following questions

1. State the full form of the followsec., Vol., et al., p.m., etc., w	owing words seen in scientific writi ww, [ibid], [id]	ng:(Any five)	5
2. State the abbreviated form of Senior, take a notice of, Circ dates	the following terms used in scientica, Journal, Copyright, please turn	fic writing (Any five) over, incorporated, no	5
Mention two rules for the use Ellipsis Apostrophes, Italics,	of items stated below:  Roman numbers		
<ul><li>4. You are given with a research</li><li>(i) APA style</li><li>⇒(ii) MLA style</li></ul>	n paper write the reference of the paper	per in	10
5. Prepare the abstract and a	list of key words for the papers thin 100 words and 3 key words).	given to you in the	20
6. Present the synopsis of the re	search topic of your interest.		40

#### VISVA-BHARATI

### PSB (Institute of Agriculture)

#### Ph.D. Course Work Examination 2024 Course Name: Advanced Data Analytics

Course No.: STAT 604 (Course-4)

Time: 2 hours

Full Marks: 50

1. What are the key assumptions of a paired t-test? Describe in details about paired-t test.  $\checkmark$  (3+7=10)

2. What are the key differences between correlation and regression? Prove that the correlation coefficient is the geometric mean of the regression coefficients. Explain the concept of spurious correlation with examples.

(2+3+5=10)

3. What are the key assumptions underlying multiple linear regression? Discuss graphical methods used to assess normality and autocorrelation in regression analysis. (4+6=10)

What are the conditions required for the validity of the Chi-Square test? The following table is based on a survey conducted in a small community to evaluate the effectiveness of a Covid vaccine.

	Covid positive	Covid negative
Vaccine Dose	24 a	289 b
1st Dose	9	100 d
2 <sup>nd</sup> Dose	13	565

Test for independence of Covid vaccination and the incidence of Covid at 5% level of significance. (3+7=10)

- 5. What is discriminant analysis? How does it differ from with other classification techniques such as cluster analysis? Explain the agglomerative hierarchical clustering method in detail. (2+2+6=10)
- 6. Define Principal Component Analysis (PCA) and explain its main objectives. How does PCA achieve its objective of dimensionality reduction? Explain the purpose of factor analysis in data analysis. (4+3+3=10)
- 7. What do you mean by machine learning? Write down the advantages of machine learning techniques. Differentiate between statistical and machine learning methods. (2+4+4=10)

8. Write short note on any two

 $(2 \times 5 = 10)$ 

- a) Fixed, random and mixed effects model
- b) K-means clustering algorithm
- c)/Sign test
- d) Poisson regression

#### Visva-Bharati

### Palli Siksha Bhavana (Institute of Agriculture)

Department of Agricultural Statistics

Ph. D. Course Work Examination 2024

Course Name: Recent Advances in the field of Specialization Course No.: STAT 607 (Course-8)

Time: 2 hours

Full Marks: 80

Questions are of value as indicated in the margin

#### Answer any five questions

1. What is meant by a time-series? Provide some examples of time-series data in the context of agriculture. Describe the key components of a time series. Explain the concept of stationarity in time series analysis. (2+2+8+4=16)

2. Suppose you are given time-series data and are asked to build a forecasting model. What steps would you follow to develop an effective forecasting model? Describe your approach in detail. (4+12=16)

3. What do you mean by machine learning? Write down the advantages of machine learning techniques. What is an Artificial Neural Network (ANN)? Explain in detail its structure, working principles, types, and applications. (2+4+10=16)

4. What are the different statistical tests used in time-series analysis, and what are their purposes? Explain the key tests required for analyzing time-series data.

5. What are missing values and outliers in a dataset? Explain the procedures for handling missing values and outlier observations, and describe the commonly used methods to address these issues during data preprocessing. (6+10=16)

What are the different types of nonlinear, volatility, and hybrid models used in time-series analysis? Explain the purpose and applications of each type of model in the context of timeseries data. (16)

What is a multivariate time series, and in what scenarios should one use VAR and STARMA models? How does the VAR model differ from the VECM? Why are wavelets commonly used in time series analysis? (6+5+5=16)

Write short note on any two

 $(2 \times 8 = 16)$ 

- a) Logistic regression
- b) MAPE and RMSE
- c) AIC and BIC
- d) ARMA model

#### Ph.D. Course Work Examination-2024 Research and Publication Ethics Course-RPE, Paper - IV **Session 2024-25**

Time: 2 Hours

Full Marks: 40

Questions are of value as indicated in the margin. (1:45 hrs for Group B & C)

#### Group-B Answer any ten questions

		10XZ = 20
<b>–</b> 1.	Explain morality in the broad sense of the term.	
2.	What is Full-text Indexing?	
<b>A</b> 3.	What is Ghost Authorship?	
/ 4/	State the full form of ONOS and INFLIBNET.	
<b>5</b> .	What is the main difference between the Digitized and Electronic Resources?	
6/		
W	Define Open Access Resource with an example.	
8/	What is the main difference between Citation and Bibliography?	
	What is i10 index?	
10	. What do you understand by the 'Helicopter Research'?	
	Explain sabotage with an example.	
12.	List out the different types of complaints.	
13.	How does selective reporting affect research validity?	( <b>x</b>
	Write two important benefits of openness in research?	
E 15/	What is meant by self archiving?	

#### Group - C Answer any two questions

Explain briefly the capacities identified by Martha Nussbaum as essential today's world.  2. What is Given in the capacities identified by Martha Nussbaum as essential today's world.	2x5=10  I to cultivate humanitati
2. What is Citation database? Mention the different types of citation databases, and features.	05 ases based on their same
3 Why is plagiarism software needed? How to avoid plagiarism?	01+04
4 Define Predatory Journal. What are its features?	02+03
5. Distinguish between copyright and creative common license.	01+04
	05