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**

Questions are of value as indicated in the margin

Answer any *five* questions

1. a. Define 'research design' and explain the use of a research design in conducting research. **16**

   b. State the criteria of a good research design. Explain the deductive and inductive procedures of research.

2. a. When a research would be called **16**

   (i) Explanatory research (ii) Exploratory research (iii) Descriptive research

   b. Describe different criteria for selecting a research problem.

3. State different ways of collecting primary data. What is the difference between 'a questionnaire' and 'a schedule'? State when a question in questioner is called (i) a loaded question (ii) a double-barreled question **16**

4. State different scales of measurements. Arrange the measurement scales in weakest to strongest order. State one variable measured in (i) nominal scale (ii) Interval Scale. **16**

5. Describe Meta analysis in the Context of repeated survey on the same subject. **16**

6. Describe an outlier observation. Why it is important to identify outlier observations in a data set? Discuss different ways to identify outlier observations. **16**

7. State when cluster sampling is useful. Write down the difference between cluster sampling and stratified random sampling. What is the difference between 'a stratum' in the context of stratified random sampling and 'a cluster' in the context of cluster sampling? **16**

8. Write short notes on any two of the following: **16**

   (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)
Ph.D. Course Work Examination 2024
Course Name: Advanced ~~Courses on Statistical Inference~~ Statistical Methods
Course No.: STAT 602 (Course-2)

Time: 3 hours **Full Marks: 80**

Questions are of value as indicated in the margin

Answer five questions

1. Explain statistical inference and state three important properties of point estimator, Find the method of moment estimator of parameter λ in the Poisson distribution **16**

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

   find the m.l.e. of θ 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**

3. Let x_1, x_2, x_3, x_4 be a random sample of size 4 from a normal population with mean μ and variance σ^2. Let t_1 and t_2 be the estimators of μ 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_1 unbiased ?
   (ii) Is T_2 unbiased ?
   (iii) Find the variance of T_1 and T_2
   (iv) Compare the efficiency of T_1 and T_2 **16**

4. Explain the concept of errors in testing of hypothesis and power of a test. State the steps involved in a nonparametric statistical test. **16**

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**

7. Show that sample mean is a consistent estimator of the population mean in normal population **16**

8. Explain any two of the terms **16**

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

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$\bar{x} \sim N(\mu, \sigma^2/n)$

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 following words seen in scientific writing:(Any five) **5**
   Sec., Vol., et al., p.m., etc., www, [ibid], [id]
2. State the abbreviated form of the following terms used in scientific writing (Any five) **5**
   Senior, take a notice of, Circa, Journal, Copyright, please turn over, incorporated, no dates
3. Mention two rules for the use of items stated below:
   Ellipsis, Apostrophes, Italics, Roman numbers
4. You are given with a research paper write the reference of the paper in **10**
   (i) APA style
   (ii) MLA style
5. Prepare the abstract and a list of key words for the papers given to you in the examination hall (abstract within 100 words and 3 key words). **20**
6. Present the synopsis of the research topic of your interest. **40**

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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. (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)

4. 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	289
1st Dose	9	100
2nd 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 (2×5 = 10)

   a) Fixed, random and mixed effects model

   b) K-means clustering algorithm

   c) Sign test

   d) Poisson regression

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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. (4+4+8=16)
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)
6. 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 time-series data. (16)
7. 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)
8. Write short note on any two (2×8 = 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** **10x2 =20**

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

Group – C
Answer any **two questions** **2x5=10**

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