Tribhuvan University
Faculty of Management
M. Phil. in Public Administration, 2081

First Semester Examination — Full Marks: 60
MPH 502: Research Methods in Public Administration-II — Time: 4 hours

Read the instruction and answer accordingly
This exam paper is divided into two parts. Part A is theory-based and Part B computer based.
Unless and otherwise stated, all notations/ terminologies have their usual meanings
Answer sheet of both part must be submitted

Part "A"

[Full Marks: 30] **[time: two hours]**

Attempt any five questions

1. Define descriptive statistics and explain its role in summarizing and presenting data of public administration. Discuss the importance of measures such as mean, median, mode, variance, and standard deviation. How can these measures be used to provide insights into a dataset, and what are some common methods for visualizing data distribution?
2. Define multicollinearity in the context of multiple regression analysis. Discuss its implications for model reliability and interpretability, including its effects on standard errors, coefficient estimates, and predictive power. How can multicollinearity be detected using methods such as Variance Inflation Factor (VIF) and correlation matrices? What strategies can be employed to address multicollinearity in regression models?
3. In a public administration study, researchers are evaluating the effectiveness of three different training programs on employee performance in a government agency. The performance scores (on a scale of 0 to 100) of employees who participated in each of the three training programs are recorded as follows:
   Training Program A: 85, 88, 82, 90, 87, 91, 84, 89, 86, 92
   Training Program B: 78, 74, 77, 79, 76, 73, 75, 80, 71, 77
   Training Program C: 92, 95, 89, 94, 97, 93, 96, 92, 98, 100
   The ANOVA table for this data is partially completed as follows:

   The ANOVA table

Source of variation	DF	Sum of Square	Mean Sum Square	F value
Due to Method		1759.2		
Residual		258.8		
Total				

   Complete the ANOVA table and determine if there is a statistically significant difference in employee performance across the three training programs. Include the formulation of hypotheses, calculation of the F-statistic, and interpretation of the results.
4. Public administration in Nepal faces various challenges, including differences in resources, infrastructure, and working conditions between urban, suburban, and rural areas. These differences may impact the job satisfaction levels of employees working in these areas. A study was conducted to compare the job satisfaction levels of public administration employees in urban, suburban, and rural settings. Job satisfaction scores (on a scale of 1 to 15) were measured as follows:
   Urban areas: [4, 5, 7, 8, 9, 6,] Suburban areas: [9, 6, 8, 7, 5] Rural areas: [8, 10, 12, 14]

Using the Kruskal-Wallis test, determine whether there is a significant difference in job satisfaction levels among public administration employees in urban, suburban, and rural areas of Nepal.

5. A study aimed to analyze the relationship between student engagement levels and their academic performance across different faculty at a university. The following contingency table summarizes the number of students categorized by their engagement level (High, Medium, Low) and their faculty (Science, Humanities, Management).

Engagement Level	Science	Humanities	Management	Total
High	50	30	100	180
Medium	30	40	200	270
Low	25	50	100	175
Total	105	120	400	625

Test the significant relationship between student engagement levels and their faculty at the university.

6. A city council wants to analyze the factors influencing citizen satisfaction with public transportation services. They collected data from a sample of 1000 citizens, including the following variables:

   Satisfaction score with public transportation (measured on a scale of 1 to 10)
   Frequency of using public transportation (number of times per week)
   Perception of safety during commute (measured on a scale of 1 to 5)
   Availability of information about routes and schedules (measured on a scale of 1 to 5)
   While conducting multiple regression analysis, the following results were obtained:
   While performing the regression analysis the following table were generated

ANOVA	df	SS	MS	F
Regression		982.031		
Residual		700.208		

Variable	Coefficients	SE	t stat
Intercept	4.951	0.114	
Frequency of using public transport	0.221	0.012	
Perception of safety during commute	0.594	0.023	
Availability of information about routes	0.416	0.023	

Dependent variable: Satisfaction score

i) Fill in the remaining part in the above table.
ii) Discuss the overall regression model at 5% level of significance.
iii) Discuss the significance of regression coefficients.

7. A city government implemented a new customer service training program for employees at its public service centers. To evaluate the effectiveness of the training, the city conducted a survey measuring citizen satisfaction before and after the training program. Satisfaction was measured on a scale from 1 to 10, where 1 indicates very dissatisfied and 10 indicates very satisfied. The following data represents the satisfaction scores from a sample of 10 citizens who used the services both before and after the training:

Citizen	1	2	3	4	5	6	7	8	9	10
Score Before	6	5	7	4	6	5	3	4	5	4
Score After	8	7	9	6	8	6	5	7	8	8

Test whether the new customer service training program has significantly improved citizen satisfaction at 5% significance level assuming that data follows all the criteria of paired t test..

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Part "B"

[Full Marks: 30] **[time: two hours]**

Attempt all questions

You have given a cleaned dataset of a study on customer satisfaction and its related variables with the datafile named **customer_satisfaction.csv** and **customer_satisfaction.sav** in csv and spss format which include 200 observations with the following variables.

1. **Customer ID** (Unique identifier)
2. **Age** (Quantitative)
3. **Gender** (Categorical: Male, Female, Other)
4. **Income** (Quantitative)
5. **Number of Visits per Month** (Quantitative)
6. **Membership Status** (Categorical: Non-Member, Silver, Gold, Platinum)
7. **Store Cleanliness Rating** (Quantitative: 1-10)
8. **Product Variety Rating** (Quantitative: 1-10)
9. **Customer Service Rating** (Quantitative: 1-10)
10. **Overall Satisfaction** (Quantitative: 1-10)

Perform any statistical software and give the answer to the following questions.

1. Obtain a simple table to represent the different categories, count and percentage to the two categorical variables gender,and Membership status. (3)

Variable	Categories	Frequency	Percentage
Gender			
Membership status			
Total			

2. Find the maximum, minimum, mean, and standard deviation of the quantitative variables age, years_of_service, training_score, number_of_projects, performance_score_before. (3)

Variable	Minimum	Maximum	Mean	Standard deviation
Age				
Income				
Nos. of visits per month				
Product Variety Rating				
Customer Service Rating				
Overall Satisfaction				

3. Categories the income into 20000-40000 and so on with upper limit excluded form and obtain the frequencies and percentage of this distribution. (3)

Income	Nos of person	Percentage
20000-40000		
40000-60000		
60000-80000		
80000-100000		
Total		

4. Obtain the bivariate distribution of membership status and gender, and test whether there is an association between these two variables using chisquare test. Is the result usable? (5)

	Gender			Total
Membership Status				
Total				
Chi Square		Conclusion:		

5. Find bivariate correlation coefficients among the variables Number of Visits per Month, Store Cleanliness Rating, Product Variety Rating, Customer Service Rating, and Overall Satisfaction. (3)

	Cleanliness	Variety	Service	Satisfaction
Number of visits per month				
Store Cleanliness Rating				
Product Variety Rating				
Customer Service Rating				

6. Find average score of customer service rating of male and female along with standard deviation also test whether there is significance difference in average value? (5)

Significance of variance

Category	Average Score	SD Score	F-value	P-value
Male				
Female				
Discussion:				

Significance of difference of means

Measure	Average difference	t-value	p-value	95% LL	95% UL
Difference of means					
Discussion:					

7. Test whether there is a significant difference in store cleanliness score according to membership status? (3)

Membership status	Mean	SD	F-value	P-value
Discussion				

8. Run a multiple regression analysis with Overall Satisfaction as the dependent variable and Store Cleanliness Rating, Customer Service Rating, Number of Visits per Month, and Age as independent variables. Obtain R^2, Adjusted R^2, and standard error of estimate. Discuss the values obtained. Obtain the ANOVA table for this regression model. Discuss the overall significance of the model. Fill in the coefficient table with t-values and p-values. Describe the meaning of the regression coefficients obtained. (5)

R^2 and SE Table

Parameter	Value	Discussion
R^2		
Adjusted R^2		
Standard Error		

ANOVA Table

ANOVA	DF	Sum of Square	Mean S S	F value	P value
Regression					
Residual					
Discussion:					

Coefficient Table

Variable	Coefficients	Standard Error	t-stat	P-value
Intercept				
Store cleanliness rating				
Customer service rating				
Number of visit per month				
Age				
Discussion:				