Tribhuvan University
Faculty of Management
M. Phil. in Public Administration, 2080

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. A company is interested in understanding the relationship between age group and mode of transportation among its employees. They surveyed a sample of 300 employees and collected data on both variables. The age groups were categorized as follows: 18-30, 30-45, and 45-60. The modes of transportation options were: Car, Public transportation, and Bike.
   The results of the survey are as follows:

Age group	Mode of transportation		
	Car	Public transportation	Bike
18-30	60	30	10
30-45	40	50	10
45-62	30	55	15

   Is there a significant relationship between age group and preferred mode of transportation among the company's employees? Perform appropriate tests for the significance of relationships and interpret the results to draw a conclusion.

2. A city's public administration department is responsible for reviewing and approving building permit applications. The department's records shows that the time it takes to process these applications follows a normal distribution with a mean of 20 days and a standard deviation of 4 days.
   a) What proportion of building permit applications is expected to be processed within 24 days?
   b) The department aims to expedite the application process. They want to set a target such that only the slowest 10% of applications take longer to process. What is the maximum number of days the department should set as the target processing time?

3. What is the difference between probability sampling and non-probability sampling methods? Discuss the potential sources of bias in non-probability sampling and how researchers can mitigate them.

4. Traffic police of Kathmandu valley is implementing a new public policy aimed at reducing the average travel time for its residents. The policy involves redesigning key intersections and implementing traffic flow improvements. Before and after the policy implementation, data on travel times was collected from a random sample of residents.

The pre-policy travel times for the sample of 100 residents had a mean of 65 minutes and a standard deviation of 12 minutes, while the post-policy travel times for another sample of 120 residents had a mean of 42 minutes and a standard deviation of 10 minutes. Assuming that the travel times are approximately normally distributed, conduct a test to determine whether the new public policy has significantly reduced the average travel time for residents. Use a significance level of 0.05.

5. The income tax department has recorded the following income of a doctor for ten days as:

Day	1	2	3	4	5	6	7	8	9	10
Income in Rs 00	68	64	63	70	71	69	70	69	65	66

Assuming that the daily income is normally distributed, on the basis of the above data is there sufficient evidence that the mean daily income is Rs. 65 hundred?

6. A company has implemented a new training program for its employees to improve their performance. The company wants to assess whether the training has a significant effect on employee performance. To do this, they randomly selected two groups of employees: Group A and Group B. Group A has undergone the training program, while Group B has not received any additional training. After a few months, the company evaluates the performance of both groups using a standardized performance assessment test.
   The performance scores (out of 100) for each group were as follows:
   Group A: 85, 78, 92, 80, 75, 88, 95, 84, 79, 82
   Group B: 74, 68, 82, 71, 79, 72, 80, 76, 70, 75, 69, 73
   Conduct a Mann-Whitney U test to determine if there is a significant difference in employee performance between Group A and Group B. Use a significance level of 0.05.

7. In Exploratory Factor Analysis (EFA), what is factor rotation, and why is it performed? Compare and contrast orthogonal rotation and oblique rotation methods with respect to their appropriateness with interpretation.

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Part "B"
[Full Marks: 30] **[time: two hours]**

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All questions are compulsory and each carries 15 marks

8. A sample survey was done by the Government of Madhesh Pradesh with 429 households and the information was recoded with filename: madhesh.sav, which has been given to you for further analysis. Use SPSS to give the answer to the following questions.

   a) Find the average annual expenditure of household of two district Dhanusha and Mahottari with standard deviations and counts

Annual Expenditure			
District	N	Average annual expenditure	Standard deviation of annual expenditure
Dhanusha			
Mahottari			

b) Is the annual expenditure significantly different between two districts?

Value of test statistics	P-value	Conclusion

c) Find the average annual expenditure, standard deviation and count of six different Palika.

Annual Expenditure			
Palika	N	Mean	Standard Deviation
Total			

d) Use appropriate test statistics to test whether the household of different Palika has different average annual expenditure?.

Value of test statistics	P-value	Conclusion

e) If there is a difference then which pair has a significantly different average value?

9. The education department of Kathmandu Metropolitan City wants to understand the factors that influence the academic performance of students in its public schools. They have collected data from 135 public schools on several quantitative variables, including "Average class size," "Percentage of students getting free lunch," and "Annual education spend per student." The dependent variable is "Average student test score".

   i) Generate summary statistics, including the mean and standard deviation and coefficient of variation of each variable and interpret the result.

Variable	Mean	Standard deviation	Coefficient of variation
Average class size(x1)			
Percentage of students getting free lunch (x2)			
Annual education spend per student (x3)			
Average student test score (x4)			
Result interpretation			

ii) Obtain the unstandardized regression coefficients of Average student test score on Average class size, percentage of student getting free lunch and Annual education spend per year along with standard error, t-value and significance.

	Unstandardized Coefficients		t-value	Sig
	Coefficients (bi)	Standard error (sbi)		
Constant				
Average Class Size(x1)				
Percentage of students getting free lunch (x2)				
Annual education spend per student (x3)				

iii) Interpret the values of the regression coefficients so obtained and also discuss the significance of these values. Write the regression equation, find R square, adjusted R square and Standard error of estimate. Also determine what percentage of variation in Average student's test score is explained by this regression equation.

Regression Coefficients	Interpretation / Significance				
Regression equation					
R- square		Adjusted R-Square		Standard Error	
What percentage of variation in Average student's test score is explained by this equation?					

iv) Assess the overall fit of the regression model and discuss its implications for the city's education department in formulating strategies to enhance the academic performance of students in public schools.

Source	df	SS	MS	F	Sig
Regression					
Residual					
Total					
Discussion on the model					