FAR WESTERN UNIVERSITY
FACULTY OF MANAGEMENT
MPhil/MPhil Leading to PhD Program in Management
Semester End Examination - 2023

FM: 100
Time: 4 Hrs.

Level: MPhil Semester: First Subject: Statistical Methods and Data Analysis

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Candidates are required to give original, insightful and analytical answers in their own words as far as practicable.

Group A: Attempt any SEVEN questions (7 × 10 = 70)

Out of 10 questions

1. One of the major measures of the quality of service provided by any organization is the speed with which it responds to customer complaints. A furniture store selling furniture and flooring including carpet, had undergone a major expansion. In particular, the flooring department has expanded from 2 installation crews to an installation supervisor, a measurer, and 15 installation crews. A sample of 36 complaints concerning carpet installation was selected during last year. Following data represents the number of days between the receipt of the complaint and the resolution of the complaint.

54	5	35	31	27	77	12	23	81	74	27	11
19	26	90	29	61	35	94	31	26	5	12	4
65	32	29	26	25	14	13	13	10	5	27	30

   i. Compute mean median first and third quartile

   ii. Compute range and interquartile range

   iii. Construct box plot. Is the data skewed? If so, how?

2. Incomes of group of 10,000 persons were found to be normally distributed with mean Rs. 1520 and standard deviation 160 find;
   i. Highest income of the poorest 2000 persons.

   ii.Lowest income of richest 1000 persons.

   iii. How many people have income between Rs. 1400 to 1600.

3. The following table shows the survey results regarding the employment status and gender in a sample of 209 management graduates of Sudur Paschim University.

Gender	Employment states	
	Currently employed	Not employed
Male	83	28
Female	64	34

   What is the probability that a graduate chosen at random
   a. Is currently employed?
   b. Is a female and currently employed?
   c. Is a female or currently employed?

d. Suppose the graduate chosen is a female, what then is the probability that she is currently employed?

4. Nepalgunj and Dhangadi sub-metropolitan city administrative offices were used to measure the satisfaction of its citizens using the social audit tool CRC (Citizen Report Card). The administrative heads introduced different training and motivational programs to their staff so as to increase the rate of satisfaction. This year the CRC reports of 150 citizens of Nepalgunj showed 120 were satisfied whereas in the case of Dhangadi 160 citizens were satisfied out of 200 surveyed. Test the hypothesis that the rate of satisfaction in these two metropolitan cities are significantly different.
5. A random sample of 25 packets of medium size mangoes is taken from a wholesaler. Suppose the weight of packets are normally distributed with standard deviation of 2.5 kg. The sample mean was found 17.8 kg. i) Find 99% confidence interval for the population mean weight. ii) What sample size is required to obtain a 99% confidence interval of width at most 1.5 kg?
6. What do you mean by sampling? If you have to do a survey on tourist, some with different countries, which sampling technique you will prefer and why?
7. Suppose the data displayed in the table below are the costs and associated number of passengers for seven 500-mile commercial airline flights using Boeing 737s during the same season of the year.

Number of passenger	61	63	67	69	70	74	76
Cost ($000)	4.28	4.08	4.42	4.17	4.48	4.3	4.82

While using software the following partial results were obtained

ANOVA Table

	df	SS	MS	F
Regression	1	0.155		
Residual	5	0.199		
Total				

Coefficient table

	Coefficients	S.E.	t-Stat	P-value
Intercept	2.3375	1.028	2.27	0.072
Nos of passenger	0.0296	0.0149	1.977	0.105

a) Use this information to develop a regression model to predict cost by number of passengers. And hence predict cost if the number of passengers is 75.
b) Interpret the meaning of slope in the model obtained above.
c) Obtain standard error of estimate and interpret its meaning.
d) What percentage of the variation in cost is explained by the number of passengers in the model above?
e) Is the overall model statistically significant?

8. You are interested to determine whether the type of government (federal, state, local) significantly impacts the average response time to citizen inquiries. You have collected response time data for citizen inquiries from each government type, resulting in the following table given below.

Response time for three different types of government are as follows

Federal Government:	9	11	10	11	12	10
State Government :	6	8	7	6	7	8
Local Government :	3	5	4	6	5	6

While calculating Sum of square between government (SSB) = 98.111 and Sum of square within government is (SSE)= 16.333. Use ANOVA to identify whether there is a significant difference in response time of different types of government, assuming that it follows all the criteria of ANOVA .

9. The following are the citizen satisfaction score before and after new policy implementation:

Before Policy Implementation	7 5	7 0	5 3	7 7	8 5	9 0	9 0	9 2
After Policy Implementation	7 7	7 5	5 8	8 0	8 9	9 8	9 5	9 8

Based on this information, can we conclude that the new policy has significantly increased citizen satisfaction?"

10. A study was conducted among a diverse sample of 1,000 individuals across the country, representing various educational backgrounds. The participants were asked to rate their perception of the effectiveness of federal government initiatives on a scale of low, moderate, or high. The cross tabulation below shows the number of people with the combination of education level with three levels of perceptions.

	Level of perception		
Education	Low	Moderate	High
High School	100	80	40
Bachelor	60	120	90
Master	30	50	80
MPhil/PhD	20	40	60

On the basis of the data given above, test whether there is association between educational attainment and perception of the effectiveness of federal government initiatives? Test at 1% level of significance.

Group B: Attempt any TWO questions (2 × 15 = 30) ***Time: 2 hours***

Unless and otherwise stated, all notations/ terminologies have their usual meanings
Attempt any questions and each carries 15 marks

1. Recently a research was conducted to study the citizen report card of selected VDC's of Chitwan and Nawalparasi district of Nepal. Some portion of this data is given to you with the file name CRC2022.sav. On the basis of this data, Operate the different function in SPSS and answer the followings:

i) the number of respondents, mean and standard deviation of monthly income by their education level.
ii) the number of respondents, mean and standard deviation of monthly income by the district where they reside.
iii) Have you found any significant difference in the average monthly income among different education levels? (Use appropriate test of hypothesis). If you got the significance difference, then show which pairs are significantly different using LSD in the Post Hoc test.
iv) Have you found any significant difference in monthly income between male and female? Use a suitable test of hypothesis.
V) Show the cross tabulation of Service evaluation and district and test whether the service evaluation is different in different distinct. Use appropriate test statistics

2. National planning commission, Nepal is performing preliminary study to determine the relationship between certain economic indicators and annual percentage change in gross national product (GNP). Two such indicators being examined are government deficit (in Lakhs Rs.) and industrial average. Data for 8 year are given below which is also given with the file name NPC.sav.

Percentage change in GNP (Y)	2.5	1	4	1	1.5	3	5	4.5
Government Deficit (x1) in Rs Lakhs	80	60	90	65	70	90	112	108
Industrial average (x2)	950	700	1100	720	850	900	1200	1150

On the basis of this data, Operate the different function in SPSS and answer the followings:
i) Obtain the unstandardized regression coefficients of percentage change in GDP on Government Deficit and Industrial average along with standard error, t-value and significant and Interpret the values of the regression coefficients so obtained and also discuss the significance of these values
iii) Obtain the fitting regression equation for these data and find the expected percentage change in GNP in a year with government deficit of Rs 120 Lakhs and industrial average of 1000.
iv) What percentage of variation in GNP is explained by this equation?
v) Discuss the overall model fit on the basis of ANOVA table.

3. You have been given a dataset containing responses from 30 people regarding their attitude towards toothpaste. The following are the six items
   1. It is imp to buy toothpaste to prevent cavities
   2. I like a toothpaste that gives shiny teeth
   3. A toothpaste should strengthen your gums
   4. I prefer a toothpaste that freshens breath
   5. Prevention of tooth decay is not imp
   6. The most imp consideration is attractive teeth

   The complete data toothpaste.spv is given to you. Use SPSS and answer the following question

Perform a factor analysis using Principal Component Analysis (PCA) with the dataset.
Provide the factor loadings for each variable on the extracted factors.
Interpret the results of the factor analysis. How many meaningful factors did you extract, and what do they represent in terms of attitude towards toothpaste ? Give each factor a meaningful label.
To ensure the reliability of the factors identified, calculate Cronbach's alpha for each factor.
Interpret the alpha values and explain their significance.