Birla Institute of Technology and Science, Pilani
First Semester 2023-24
Supply Chain Modelling and Empirical Analysis (MF F422)
Comprehensive Examination (Closed Book) Date: 09/12/2023 [9 AM to 12 M]
Max Mark: 45 **Max. Time: 120 Minutes**

Q1. In empirical analysis, the sample collection plays an important role for further analysis. One has to know the following aspects of the sample collection and design.

A. Mention and define the three parameters which are critical for determining the sample size. Derive expression for sample size in terms of *Coefficient of Variation, Range* and *Z value* considering sample parameters are normally distributed.

B. Discuss and compare the Stratified Sampling and Cluster Sampling

[10+05]

Q2.

A. Mention and explain in detail the four types of *Primary Scales of Measurement*.

B. How are the *inputs to Closeness Ratio* and *Closeness Ratio of each alternative* calculated in TOPSIS? **[05+05]**

Q3.

A. Regression analysis examines associative relationships between a metric dependent variable and one or more independent variables in the three ways. Mention and explain the three ways in detail.

B. Explain in detail the *General Procedure for Hypothesis Testing* through the flow chart.

C. What do you understand by the *System Boundaries* and *Functional Unit* in LCA. Also mention and explain the *three product life cycle methods* generally used in LCA. **[06+06+08]**

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Comprehensive Examination (Open Book) Date: 09/12/2023 [9 AM to 12 M]
Max Mark: 25 **Max. Time: 60 Minutes**

Q1.

In the Metro University Dining Club, 200 students are interviewed to know their intention to join the club. Manger would like to analyze the results by living arrangement (type and location of the student housing and eating arrangements). The 200 responses are classified into four categories shown in the accompanying Table.

Living Arrangement	Intend to join	Number interviewed
Doom/fraternity	16	90
Apartment/Rooming house, nearby	13	40
Apartment/Rooming house, distant	16	40
Live at home	15	30
Total	**60**	**200**

Do these variations indicate there is a significance difference among these students regarding "intending to join in club" and "living arrangement" . Use the significance level of 0.05 and tabulated value of the appropriate test to be conducted is 7.82 for the significance level. **[10]**

Q2.

Six factors of Electric Vehicle charging infrastructure is given along with the self-interaction matrix. Classify the factors through Driving - Dependence power diagram. **[15]**

S.No.	Factor	Nomenclature
1	Charging speed	EV1
2	Site Accessibility	EV2
3	EV density	EV3
4	Battery Maximum Storage	EV4
5	Infrastructure Investment	EV5
6	Clean energy potential	EV6

Structural Self-interaction Matrix

	EV6	EV5	EV4	EV3	EV2	EV1
EV1	O	V	V	V	V	
EV2	O	V	O	O		
EV3	O	A	A			
EV4	O	O				
EV5	X					
EV6						

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