PGDM (RM/IB) (20-22)

Statistics for Business Analysis

IB-101//RM-107

Trimester – I, End-Term Examination: October 2020

Time allowed: 2 hrs 30 min Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means.** In case of rough work please use answer sheet.

Sections	No. of Questions to attempt	Marks	Marks
A	3 questions with internal choices and CILO covered	10 Marks each	3*10 = 30
B	Compulsory Case Study	20 Marks	20
		Total Marks	**50**

SECTION A

A1. (CILO 1)

1. In the electronics industry, component parts are commonly shipped from suppliers in large lots. Companies use acceptance sampling to monitor incoming shipments of parts, raw materials, etc. for the assurance of quality control. Havell's electronics accepts a lot from a particular supplier if the defective components in the lot do not exceed 1%. Suppose a random sample of 5 items from a recent shipment is tested.

Assume that 1% of the shipment is defective.

a. Compute the probability that no items in the sample are defective. (2.5 marks)

b. Compute the probability that exactly one item in the sample is defective. (2.5 marks)

c. What is the probability of observing one or more defective items in the sample?2.5 marks)

d. Would you feel comfortable accepting the shipment if one item was found to be defective? Why or why not? (2.5 marks)

OR

2. The quality control manager of Britannia cookies is inspecting a batch of chocolate- chip cookies that has just been baked. If the production process is in control, the mean number of chips parts per cookie is 6.0. What is the probability that in any particular cookie being inspected

a. less than five chip parts will be found? (2.5 marks)
b. exactly five chip parts will be found? (2.5 marks)
c. five or more chip parts will be found? (2.5 marks)
d. either four or five chip parts will be found? (2.5 marks)

A 2. (CILO 2)

1. The Marketing director of a large department store wants to estimate the average number of customers who enter the store every 5 minutes. She randomly selects 5 minute interval sand counts the number of arrivals at the store. She obtains the figures 58, 32, 41, 47, 56, 80, 45, 29, 32, and 78. The analyst assumes the number of arrivals in normally distributed. Using these data, analyst computes a 95% confidence interval to estimate the mean value for all 5-minute intervals. What interval values does she get? (10marks)

OR

2. The mean number of hours of flying time for pilots at Continental Airlines is 49 hours per month. Assume that this mean was based on actual flying times for a sample of 100 Continental pilots and that the sample standard deviation was 8.5 hours.

a. At 93% confidence what is the margin error? (5 marks)
b. What is the 93 % confidence interval estimate of the population mean flying time for the pilots? (5 marks)

A3. (CILO 3)

1. Americans spend an average of 8.6 minutes per day reading newspapers (U.S.A. Today, October 10, 2020). A researcher believes than individuals in management

positions spend more than the national average time per day reading newspapers. A sample of individuals in management positions will be selected by the researcher. Data on newspaper-reading times will be used to test the following null and alternative hypotheses. $H_0 : \mu \leq 8.6$ vs $H_a : \mu > 8.6$.

a. What is the Type I error in this situation? What are the consequences of making this error? (5 marks)

b. What is the Type II error in this situation? What are the consequences of making this error? (5 marks)

2. The phrase made in China has become an issue of concern in the last few years, as Indian companies tries to protect their products from overseas competition. In these years a major trade imbalance in India has been caused by a flood of imported goods that enter the country and are sold at lower prices than comparable Indian made goods. One prime concern is the electronic goods in which total imported items have steadily increased during the year 2012 onwards .The Indian companies have been worried on complaints about product quality, worker layoffs, and high prices and has spent millions in advertising to produce electronic goods that will satisfy consumer demands. Have these companies successful in stopping the flood these imported goods purchased by Indian consumers? The given data represent the volume of imported goods sold in India for the years 2012-2018. To simplify the analysis, we have coded the year using the coded variable x =Year 2012

Year	x=Year 2012	Volume of Import (in Rs.billion)
2012	0	1.1
2013	1	1.6
2014	2	1.8
2015	3	1.5
2016	4	2.3
2017	5	2.4
2018	6	2.6

Questions for discussion:

1. Find the least-square line for predicting the volume of import as a function of year for the years 2012-2019. (5 marks)
2. Predict the volume of import of goods for each of the years 2010 and 2019. (2.5 marks)

3. Given the form of the scattered diagram for the years, does it appear that a straight line provides an accurate model for the data? (2.5 marks)

SECTION B

Case : *Cost of attendance to schools by Family Income* (CILO 3)

Harvard University has recently revolutionized its financial aid policies, aimed at easing the financial strain on middle and upper-middle income families. The expected contribution of students who are admitted to Harvard has been greatly reduced. Many other elite private colleges are following suit to compete for top students. The motivation for these policy changes stems from the competition from public universities as well as political pressure.

A spokesperson from an elite college claims that elite colleges have been very responsive to financial hardship faced by families due to rising costs of education. Now, he says, families with income of $40,000 will have to spend less than $6500 to send their children to prestigious colleges. Similarly, families with incomes of $80,000 and $12,000 will have to spend less than $20,000 and $35,000, respectively, for their children's education.

Although in general, the cost of attendance has gone down at each family-income level, it still varies by thousands of dollars amongst prestigious schools. The accompanying table shows information on the cost of attendance by family income for 10 prestigious schools.(Jaggia)

Cost of attendance to schools by Family Income

School	Family Income		
	$40,000	**$80,000**	**$120,000**
A	$5302	$19731	$37558
B	$5502	$19931	$37758
C	$4500	$12800	$36845
D	$5702	$20131	$37958
E	$3700	$8000	$16000
F	$6311	$26120	$44146
G	$5516	$19655	$37283
H	$3887	$11055	$17792
I	$10306	$19828	$25039
J	$4300	$6048	$13946

In a report, use the sample information to:

B.1 Determine whether families with income of $40,000 will have to spend less than $6,500 to send their children to prestigious colleges. (Use alpha=0.05)

(5 marks)

B.2 Repeat the hypothesis test from part I by testing the spokesman's claims concerning college cost for families with income of $80,000 and $120,000, respectively. (Use alpha=0.05) (10 marks)

B.3 Assess the validity of the spokesman's claim, from the results obtained in the above two data analysis. (5 marks)