

JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA
PGDM / PGDM (M) / PGDM (SM)
FIFTH TRIMESTER (Batch 2022-24)
ENDTERM EXAMINATION, January-2024

Course Name	Total Quality Management & Lean Six Sigma	Course Code	20528
Max. Time	2 hours	Max. Marks	40 MM

INSTRUCTIONS:

- This is an open book exam. Only one text book is allowed during exam.
- All Questions are compulsory.
- Exchange of calculators and text book is strictly prohibited.

Case – Southwestern University

The popularity of Southwestern University’s football program under its new coach Phil Flamm surged in each of the 5 years since his arrival at the Stephenville, Texas, college. With a football stadium close to maxim out at 54,000 seats and a vocal coach pushing for a new stadium, SWU president Joel Wisner faced some difficult decisions. After a phenomenal upset victory over its archrival, the university of Texas, at the homecoming game in the fall, Dr. Wisner was not as happy as one would think. Instead of ecstatic alumni, students, and faculty, all Wisner heard were complaints. “The lines at the concession stands were too long”; “Parking was harder to find and farther away than in the old days” (that is, before the team won regularly); “Seats weren’t comfortable”; “Traffic was backed up halfway to Dallas”; and on and on. “A college president just can’t win,” muttered Wisner to himself.

At his staff meeting the following Monday, Wisner turned to his VP of administration, Leslie Gardner. “I wish you would take care of these football complaints, Leslie” he said. “See what the real problems are and let me know how you have solved them.” Gardner wasn’t surprised at the request. “I have already got a handle on it, Joel” she replied. We have been randomly surveying 50 fans per game for the past year to see what’s on their minds. It’s all part of my campuswide TQM effort. Let me tally things up and I will get back to you in a week.”

When she returned to her office, Gardner pulled out the file her assistant had compiled, as given in Part A and Part B of the following table. There is a lot of information here,” she thought.

- Choose at least two quality tools for analyzing the data and proposing a solution based on your analysis. **(14 Marks)**

Fan Satisfaction Survey: Part A						
		OVERALL GRADE				
		A	B	C	D	F
Game Day	Parking	90	105	45	5	5
	Traffic	50	85	48	52	15
	Seating	45	30	115	35	25
	Entertainment	160	35	26	10	19
	Printed Program	66	34	98	22	30
Tickets	Pricing	105	104	16	15	10
	Season Ticket Plans	75	80	54	41	0
Concessions	Prices	16	116	58	58	2
	Selection of Foods	155	60	24	11	0
	Speed of Service	35	45	46	48	76

Fan Satisfaction Survey: Part B Open Ended Comments on Survey cards:		
Parking a mess	Not enough cops for traffic	Expand parking lots
Add a skybox	More hot dog stands	Hot dogs cold
Double the parking attendants	Seats are all metal	Took an hour to park
Too crowded	Need skyboxes	Programs overpriced
Seats too narrow	Seats stink	Want softer seats
I smelled drugs drugs being smoked	Lines are awful	Dirty bathroom
Seats are like rocks	Toilets weren't clean	Put in bigger seats
Stadium is ancient	Put in bigger seats	Hire more traffic cops

*Survey Respondents: Alumnus 113; Student 83; Faculty/Staff 16; Others 38.

2) Super Cola bottles soft drinks labeled "net weight 12 ounces". Indeed, an overall process average of 12 ounces has been found by taking many samples, in which each sample contained 5 bottles. The average range of the process is 0.25 ounce. Quality manager wants to determine the upper and lower control limits for averages in this process? Estimate the upper and lower control limits, if each sample contained 4 bottles? **(4 Marks)**

3) You are the process improvement manager and have developed a new machine to cut insoles for the company's top-of-the-line running shoes. You are excited because the company's goal is no more than 3.4 defects per million and this machine may be the innovation you need. The insoles cannot be

more than ± 0.001 of an inch from the required thickness of 0.250" and estimated deviation is 0.005. Estimate the C_p , C_{pu} , C_{pl} , and C_{pk} for this machine. You want to know if you should replace the existing machine, which has a C_{pk} of 1.0. (6 Marks)

4) Organic Grains LLC uses statistical process control to ensure that its health-conscious, low-fat, multigrain sandwich loaves have the proper weight. Based on a previously stable and in-control process, the control limits of the \bar{x} and R -charts are $UCL_{\bar{x}} = 6.56$, $LCL_{\bar{x}} = 5.84$, $UCL_R = 1.141$, and $LCL_R = 0$. Over the past few days, they have taken five random samples of four loaves each and have found the following:

Sample	Net Weight			
	LOAF#1	LOAF#2	LOAF#3	LOAF#4
1	6.3	6	5.9	5.9
2	6	6	6.3	5.9
3	6.3	4.8	5.6	5.2
4	6.2	6	6.2	5.9
5	6.5	6.6	6.5	6.9

Evaluate the process is still in control or not? Discuss the findings.

(8 Marks)

5) Compare and contrast the theories and principles proposed by Walter Shewart, Edwards Deming, and Juran. Also, Elaborate on their roles in the formulation of award and certification giving bodies such as Malcom Baldrige, Deming's Prize and ISO.

(8 Marks)

Table for Control Chart factors (Also available in text book)

Sample Size = m	A ₂	A ₃	d ₂	D ₃	D ₄	B ₃	B ₄
2	1.880	2.659	1.128	0	3.267	0	3.267
3	1.023	1.954	1.693	0	2.574	0	2.568
4	0.729	1.628	2.059	0	2.282	0	2.266
5	0.577	1.427	2.326	0	2.114	0	2.089
6	0.483	1.287	2.534	0	2.004	0.030	1.970
7	0.419	1.182	2.704	0.076	1.924	0.118	1.882
8	0.373	1.099	2.847	0.136	1.864	0.185	1.815
9	0.337	1.032	2.970	0.184	1.816	0.239	1.761
10	0.308	0.975	3.078	0.223	1.777	0.284	1.716
11	0.285	0.927	3.173	0.256	1.744	0.321	1.679
12	0.266	0.886	3.258	0.283	1.717	0.354	1.646
13	0.249	0.850	3.336	0.307	1.693	0.382	1.618
14	0.235	0.817	3.407	0.328	1.672	0.406	1.594
15	0.223	0.789	3.472	0.347	1.653	0.428	1.572
16	0.212	0.763	3.532	0.363	1.637	0.448	1.552
17	0.203	0.739	3.588	0.378	1.622	0.466	1.534
18	0.194	0.718	3.640	0.391	1.608	0.482	1.518
19	0.187	0.698	3.689	0.403	1.597	0.497	1.503
20	0.180	0.680	3.735	0.415	1.585	0.510	1.490
21	0.173	0.663	3.778	0.425	1.575	0.523	1.477
22	0.167	0.647	3.819	0.434	1.566	0.534	1.466
23	0.162	0.633	3.858	0.443	1.557	0.545	1.455
24	0.157	0.619	3.895	0.451	1.548	0.555	1.445
25	0.153	0.606	3.931	0.459	1.541	0.565	1.435