PGDM/IB, 2019-21

TQM-Manufacturing and Services

DM-543/IB-543

Trimester – V, End-Term Examination: December 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.** All other instructions on the reverse of Admit Card should be followed meticulously.

Sections	**No. of Questions to attempt**	**Marks**	**Total Marks**
A	Minimum 3 question with internal choices and CILO (Course Intended Learning Outcome) covered Or Maximum 6 questions with internal choices and CILO covered (as an example)	3*10 Or 6*5	30
B	Compulsory Case Study with minimum of 2 questions	20	20
			50

Section A

Q1. CILO 02 (Marks 10)

A. 5 marks
The number of non-confirming microchips obtained from 20 random samples is shown in table below. The corresponding sample size is also indicated. Construct a attribute chart with control limits for each sample. Also deliberate the inference you draw from this chart?

Sample	Inspected Microchips	Nonconforming Microchips	Sample	Inspected Microchips	Nonconforming Microchips
1	50		11	80	
2	90		12	120	
3	100		13	100	
4	90		14	80	
5	80		15	110	
6	40		16	40	
7	50		17	40	
8	50		18	50	
9	110		19	120	
10	70		20	50	

B. 3+2 marks

1. Is it possible for a process to be in control and still produce nonconforming output? Explain? What are some corrective measures under these circumstances?
2. What are the advantages of having a process spread that is less than the specification spread? What should be the value of Cp in this situation?

Q2. CILO 03 910 Marks)

A.1. 3 marks
A major record-of–the-month club collected data on the reason for returned shipments during a quarter. Results are wrong selection, 50,000; refused, 1,95,000; wrong address, 68,000; order cancelled, 5,000; and other, 15,000. Construct a Pareto diagram.

A.2. 2 marks
Prepare a cause and effect diagram for bad coffee from a Café Coffee Beverages coffee maker used in the campus.

B. Describe Juran's quality trilogy philosophy? How it stands relevant under the total quality management approach?

Q3. 10 marks
Backwoods American Inc. produces expensive water-repellent, down-lined parkas. The company implemented a total quality-management program in 2015. Following are quality related accounting data that have been accumulated for the five-year period after the program's start.

Year					
	2011	2012	2013	2014	2015
Prevention					
Appraisal					
Internal Failure					
External Failure					
Accounting Measure (000's)					
Sales					
Manufacturing Cost					

a. Compute the company's total failure costs as a percentage of total quality cost for each of the five years. Does there appear to be a trend to this result.
b. Speculate on what the company's quality strategy appears to be.
c. Compute quality sales indices and quality cost indices for each of the five year. Is it possible to assess the effectiveness of the company's quality management program from these index values?

Section B

North Shore University Hospital: A Six Sigma

North Shore University Hospital in Manhasset, New York, is part of the North Shore-Long Island Jewish Health System, the third largest non-sectarian health system in the United States with 14 hospitals. The hospital used Six Sigma on a project to reduce delays in bed assignment turnaround time. The problem analysis showed that delays in the post-anaesthesia care unit and the emergency department resulted in the hospital not always having the staff or beds available to accept additional patients, which resulted in delays in start times in the operating room and a decrease in patient and physician satisfaction. It was subsequently realized that staff were incorrectly using the bed tracking system (BTS), the electronic system that indicates the status of each bed. Delays in bed turnaround time resulted in delayed notification of a ready bed to the RN (registered nurse) responsible for the patient admission process. This led to delays in the operating room and emergency department and impacted the patient flow throughout the hospital. The bed turnaround time project focused on one surgical nursing unit that had 2,578 discharged patients in one year.

During the "define" stage of the Six Sigma DMAIC process, the project team developed a process map of the steps in the discharge-admission process. The admission RNs were identified as the primary customers of the process and they were surveyed to establish process targets. These "voice of the customer (VoC)" responses helped establish a target turnaround time of 120 minutes with an upper limit of 150 minutes. In the "measure" stage of DMAIC, a defect was defined as any time the turnaround time exceeded 150 minutes. The team measured the process by having a team member on the surgical unit monitor the process for one week, which yielded data on 195 patients. Based on the data (which showed 130 defects). the team calculated a DPMO of 672,725, which translated to a score of 1 sigma. The average turnaround time was 226 minutes. The team then developed a cause-and-effect diagram to help identify all the variables that affected the turnaround time.

During the "analyse" step of the DMAIC process, the variables that impacted the turnaround time process were discussed, targeted for statistical analysis, and prioritized. The team investigations at this stage showed that a communication failure and a technical failure at two key steps in the process caused significant delays. The team realized that the staff lacked proficiency in the use of the BTS. The lack of communication between the admission RNs and other patient care team members was identified as a priority, as was the lack of timely notification of a ready bed to the admission RN.

Several solutions were developed to resolve these problems, including staff training and the use of improved documentation about discharge patients, laminated bedside cards, and reformatted beepers for RNs to accelerate the process. In the "improve" step, the turnaround time was reduced from a mean of 226 minutes to 90 minutes, which resulted in a metric of 2.3 sigma by the time the project ended. In the "control" step moving range and SPC charts were used to monitor turnaround times, and the turnaround time continued to improve to 69 minutes.

The results of this project were subsequently applied to all nursing units in the hospital. Patient satisfaction scores improved in two categories related to readiness for discharge and speed of the discharge process. Since
initiating its Six Sigma program, the health system has completed over 60 Six Sigma projects and trained 24 Black Belts, 70 Green Belts, and two master Black Belts.

Q1. Justify the role of quality function deployment in DMAIC process in this case? How important is “VOC” considering the case and the facts shared?

Q2. The case has defined one of the defect as “any time the turnaround time exceeded 150 minutes” and few more, please evaluate all the defects pursued by the DMAIC team for 6 sigma process and give your views, as to how correct they are or if any other defect can be recommended by you? (kindly note that each defect recommended by you will carry 1 mark)

Q3. Please suggest the important measure the team should have taken in order to undertake the DMAIC process? Kindly evaluate the DPMO level achieved by the team which implementing the DMAIC process?

Q4. Appraise and suggest, the TQM steps the company should have considered before implementing the DMAIC process, to avoid 6 sigma implementation?