TQM – Manufacturing and Services

DM-542/IB-512

Trimester-V, End Term Examination: December 2014

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 the answer sheet.

Section A

Please answer ANY THREE questions. Each question carries 5 marks. Please be brief.

1. Philip Crosby said 'Quality is free.' Do you agree? Explain your answer.
2. Benchmarking studies are a search for two types of information – an understanding of best-in-class processes, and the performance metrics that result. In your opinion, which information is more important? Why?
3. What is the basic theory on which statistical process control is based? Can SQC be used for any process?
4. Of the seven quality tools commonly used for problem solving, discuss any two.
5. Why is problem solving so important for quality improvement? Can you suggest a process that managers can use for problem solving?

Section B

Please answer ANY TWO questions. Each question carries 10 marks.

1. Study the table below – it gives the cost of operations appraisal, and production cost for a factory for seven months. Draw a rough trend graph for the operations appraisal cost/production cost ratio. What information does the graph give? Is there any other information that could be valuable in interpreting the trend?

Month	Operation Appraisal cost ('000s)	Production costs ('000s)
Jan	$10	$100
Feb	$13	$120
Mar	$9	$115
Apr	$11	$145
May	$9	$125
Jun	$8	$95
Jul	$8	$105

2. Determine the central line and control limits for a p-chart using the following data, which are for the number of defects produced by a machining process. Plot the values and determine if the process is under control. How will you define capability for this process?

Sample No.	Number Inspected	Number of Defectives	Sample No.	Number Inspected	Number of Defectives
1	300	3	13	300	6
2	300	6	14	300	7
3	300	4	15	300	4
4	300	6	16	300	5
5	300	2	17	300	7
6	300	6	18	300	5
7	300	7	19	300	0
8	300	3	20	300	2
9	300	0	21	300	3
10	300	6	22	300	6
11	300	9	23	300	1
12	300	5	24	300	8

3. Toyota transformed the NUMMI plant of General Motors in just 12 months. How do you think Toyota managed to achieve this?

Section C

Read the caselet given below and answer the question that follows. This section carries 15 marks.

On a specific Tuesday, the management committee meeting (MCM) is in progress in the plant. This is being attended by the Managing Director (MD), the Joint MD, and the heads of Marketing and Sales, Production, Stores, Quality Inspection, Engineering, Parts Procurement, and certain support functions like HR and IT. The purpose is to review the performance parameters of the week gone by. Almost invariably the discussion centres around sales and production numbers. The company has missed its sales targets (though marginally) in the past week, and there is an export order that is waiting for production before the cars can be shipped. Production seems to be the bottleneck. The head of production puts the blame squarely on Parts Procurement, complaining that he was unable to get the optimum production because of frequent unavailability of parts. The head of Parts Procurement is rebuked by the MD and the JMD. The head of IT rattles out data about the number of times the assembly line had to be stopped, or it had to run in the 'Line Ran Without Part' LRWP mode in the past week. It was possible to run the assembly line even when certain parts were not available in stock – these parts were later retro-fitted into the car after assembly was over. The MD admonishes the Parts Procurement head that such

occurrences must be controlled in future. All this is recorded by a junior executive, Y, who sits in these meetings to write the minutes.

Y knows that this was how a typical MCM was. Week after week the same thing happens and the final blame comes on Parts Procurement. Y wondered if anything meaningful was ever done with the daily data collected by the IT function, especially the data on line stoppage and LRWP. He makes a mental note to take a look at a sample data from IT.

The sample data from IT is given in Annexure 1.

1. Take a look at Annexure 1. Can you use any of the quality tools to analyze the data so that one could make better sense of it? What is your conclusion after the analysis?

Annexure 1

Date	Location	Line Stoppage (in minutes)	LRWC	Unavailable Parts
7 June 1999	Assembly 3	23		Clutch Assy, Wiring Harness 1
8 June 1999	Assembly 3	78	Yes	HVAC, Wiring Harness 4, GSL YE2
9 June 1999	Assembly 3	14	Yes	Relay Assy, Brake Assy
10 June 1999	Assembly 1		Yes	Instrument Panel
11 June 1999	Assembly 1	19		Wiring Harness 3
12 June 1999	Assembly 3	31	Yes	HVAC, Relay Assy
Sunday				
14 June 1999	Assembly 1		Yes	Trim Fr
15 June 1999	Assembly 2		Yes	Lamp Fr
16 June 1999	Assembly 3	109		Wiring Harness 2, Relay Stop Lamp
17 June 1999	Assembly 2		Yes	Recliner
18 June 1999	Assembly 3	07		Clutch Assy
19 June 1999	Assembly 1	18	Yes	Brake Assy, Relay Assy
Sunday				
21 June 1999	Assembly 3	23		Wiring Harness 1
22 June 1999	Assembly 1	14	Yes	Recliner, GSL 800
23 June 1999	Assembly 1	44		GSL 800, Brake Assy
24 June 1999	Assembly 1		Yes	Recliner
25 June 1999	Assembly 3	39		Wiring Harness 1, Relay Assy
26 June 1999	Assembly 3	19	Yes	Instrument Panel, Wiring Harness 2
Sunday				
27 June 1999	Assembly 1		Yes	Instrument Panel

Note: Please see the table below for information on relevant part suppliers.

Part Suppliers

Part Number	Part Name	Supplier 1	Supplier 2
31103M65320	Brake Assy	Kamani Brakes	Brakes Auto
78112M82023	Recliner	Bharat Auto	Techniko
98731M80210	Wiring Harness 3	Mayur Ind	Hindarika
98231M82010	Instrument Panel	Tricol	
98276M74F32	Lamp Fr	Autolite	
98755M82320	Relay Assy	Mayur Ind	Hindarika
98100M86011	HVAC	Suzko	
98731M83210	Wiring Harness 1	Mayur Ind	Hindarika
98108M82010	GSL 800	Bharat Auto	Techniko
78233M83420	Trim Fr	Plastico	
98730M72F22	Wiring Harness 4	Mayur Ind	Hindarika
32110M67480	Clutch Assy	CD Auto	Clutch India
98766M83450	Relay Stop Lamp	Mayur Ind	Hindarika
98732M82322	Wiring Harness 2	Mayur Ind	Hindarika