Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: TQM and SIX Sigma (LSCM 8011) **Semester:** III

Programme: MBA Logistics & Supply Chain Management

Time: 03 hrs. **Max. Marks: 100**

Instructions:

SECTION A **Marks 20**

S. No.			Marks	CO
Q 01		Fill the blanks with the **most suitable** word from the **word-bank** given below.		
	a	Quality solution approach to a ……. problem is to restore the status quo and that for a chronic problem is to ……. the status quo; the former is accomplished by a proper system of ……. and, the latter is accomplished by taking a series of ……. to accomplish the objective	1x4	CO 01 CO 03
	b	To manage the sporadic and chronic quality problems leading to waste can effectively be dealt on a continuous basis by systematic Quality Planning for Quality ……. and Quality …….– these three are otherwise known as ……. or, Quality …….	1x4	CO 01 CO 03
	c	The approaches and, the tools used in Total Quality Management can also be used for other parameters than waste, e.g. ……., ……. and, ……. etc.	1x3	CO 01 CO 03
	d	A proper ……. of the process drawn at the appropriate ……. should help to take two types of journeys viz., ……. journey i.e. from symptoms to ……. and, ……. journey i.e. from cause to …….	1x6	CO 01 CO 03
	e	Quality Gurus have often condensed the essence of Total Quality in a short and precise phrase. These wisdom statements are supplementary, they do not contradictory, they emphasis a particular aspect, as a result we have many profound insights into Total Quality. Some of them are – *"Confirmation to Specification"* it was proposed by ……. *"Predictable Degree of Uniformity"* was proposed by ……. and, *"Loss to Society"* proposed by …….	1x3	CO 01 CO 03
		Please choose the word from below		

Crosby	Control	Change	quality improvement projects
remedy	Remedial	quality control	Improvement
diagnostic	Trilogy	Taguchi	cycle time
safety	Deming	Cause	flow chart
Juran	Level	sporadic	Productivity

SECTION B **02x20 = 40 Marks**

(DO ANY TWO OF QUESTIONS : Q 02, Q03 and Q 04)

Q 02

a. Give simple, short, one-line definition of Quality Cost — **05** — **CO 01**

b. What are the sources of Quality Cost, discuss — **05** — **CO 03**

c. What is your observation on the annual quality cost data given below for a tire company? Give at least five distinct observations — **10**

ANNUAL QUALITY COST : Mercury Tires Ltd., Dehradun

all figures in Rs.

Cost of Quality Failures		**Cost of Appraisal**	
Defective Stock	3,276	Incoming Inspection	32,655
Repairs and Rework	73,229	Process Inspection	32,582
Scarp Collection	2,288	Output Inspection	25,200
Scrap Generated	187,428	Spot Inspection	65,910
Consumer Adjustments	408,200	**T O T A L**	147,347
Downgrading and Seconds	22,838	**Cost of Prevention**	
Customer Dissatisfaction	NA	Local Plant QC Dept.	7,848
Migration of Loyal Customers	NA	Corporate QC Dept.	30,000
T O T A L	**697,259**	**T O T A L**	**37,848**

G R A N D T O T A L **882,454**

Q 03

Discuss **any two** of the following; clearly write "Purpose", "When to Use", "How to Use", "Benefits" and give "Example" — **CO 01**

a. Cause and Effect Analysis — **10**

b. Process Capability — **10**

c. Process Capability Index — **10**

Q 04	**a.** What is Pareto Priority Index? discuss b. Construct a Pareto Priority Index and rank the candidate projects based on the data given below c. Will you propose Management to go for the top ranking project or, use some qualitative criteria to consider along with the rankings; what are those criteria, discuss	**05** **05** **10**	**CO 02**

Project	**Savings** (Rs. in '000)	**Probability of Success**	**Cost** (Rs. in '000)	**Project Completion Time** (in Years)
A	100	0.7	10.0	2.00
B	50	0.7	2.0	1.00
C	30	0.8	1.6	0.25
D	10	0.9	0.5	0.50
E	1.5	0.6	1.0	0.10

SECTION-C

Q 05	Based on case-let given below, answer the following questions a. Discuss Big Q with reference to the case. b. Discuss the difference between cost cutting and cost erosion. c. Which were the four specific areas, identified by Mr. Prakash as part of cost-erosion initiatives. d. What were the benefits accruing to Tata Motors on implementing the cost-erosion exercise and the quality management project?	**10** **10** **10** **10**	**CO 01** **CO 02** **CO 03**

Caselet: Quality is King

Company **:** Tata Motors, previously known as Tata Engineering & Locomotive Co. Ltd. (TELCO), is one of the largest companies in the Tata Group, and one of India's largest business houses. Tata Motors is India's leading commercial vehicle manufacturer and third largest passenger car manufacturer. The company is sixth largest truck manufacturer in the world. Tata Motors recently received the Balanced Scorecard Collaborative Hall of Fame Award for having achieved a significant turn-around of its overall performance. A comprehensive quality improvement and cost-cutting initiative in September 2000 has played an important role in the company's turnaround, from a of Rs. 500 million in the year ending March 2001 to a profit of Rs 28 million in the first quarter of 2002-2001. Tata Motors has two main business segments: Commercial Vehicle Business Unit (CVBU) and Passenger Car Business Unit (PCBU).

The Cost of Success **:** The people at Tata Engineering do not fancy the phrase "cost cutting" for no other reason than that they see it as inadequate, even misleading in their context. "cost erosion" is a preferred terminology at India's largest automotive company, simply because it captures the breakthrough exercise that has saved more than Rs. 600 million off Tata Engineering's expenses over the last two years. The big positive of the cost erosion initiative goes beyond the statistics of money saved. It is going to be a permanent

feature of Tata Engineering's agenda for the future. However, the problem is that the going gets tougher on this score with every passing month, because finding new costs to eliminate becomes ever more difficult.

The cost erosion initiative, which began in in April 2000, is arguably the most important element in a remarkable revival that has seen Tata Engineering recover from a loss of Rs. 500 million in the year ended March 2001 to a profit of Rs. 28 million in the first quarter of 2002-2003. Prakash M. Telang, senior vice president (manufacturing), was designated the "cost-erosion champion" and put in charge of the entire initiative. Four specific areas were identified:

- Direct material cost; which constitute roughly 65% of all costs
- Variable conversion cost viz., power, fuel, water, tools etc.
- Fixed costs viz., labour, marketing, corporate expenses, plan operations, research & development
- Financial structure viz., working capital, debt restructuring, balance sheet etc.

Mr. Telang says, "Everybody had a cost erosion target built into his area of work and we saw a cascading effect take hold"

Three-tiered teams – members, leaders, champions – were put at the plant level to implement, drive and monitor the exercise across the organization. The task began with spreading the cost-reduction message, emphasizing its importance to bring the company back to good health, and defining the methods to accomplish it. The company union was co=opted to communicate the program and the house journal did the same.

Quality Management : Tata Motors started a comprehensive quality improvement initiative in September 2000. The initiative played an important role in the company's turnaround. Every year, about a quarter of Tata Motors' workforce went through training courses, which were rated highly in the Indian engineering industry.

The company's quality management project and its cost erosion exercise have run concurrently, and each has helped the other. For one, its people understood that cutting costs did not mean cutting corners. The same teams and the same people were involved in both exercises. This led to many win-win situations.

With operating margins in its flagship commercial vehicle operations now up at about 13 percent, Tata Engineering can afford to breadth easy. Where two years back it looked dark star, the future now promises the rewards of a war that seems well and truly won.

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Instructions: Prof. Balaram Swamy J.

SECTION A — Marks 20

S. No.			Marks	CO
Q 01		Fill the blanks for a and b with **most suitable** word from the **word-bank** given below.		
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	b	The approaches and, the tools used in Total Quality Management can also be used for other parameters than waste, e.g. ……., ……. and, ……. etc.	1x3	CO 01 CO 03
		WORD BANK :*Please choose the word from below* *Productivity* *Process Improvement* *Statistical quality control* *Sporadic* *cycle time* *Change* *safety*		
	c	**Match the Following**	1x13	
		I Walter Shewart : Theory of Profound Knowledge II Appraisal : Correcting or replacing of products after shipment to the customer III W. Edward Deming : Quality Trilogy IV Prevention : Correcting or replacing of products that fail to confirm to specifications		CO 01 CO 03

		V Joseph Juran : Total Quality Control VI Internal Failure : All activities specifically designed to prevent defects VII Armand Feigenbaum : *Gemba* Kaizen VIII Philip Crosby : Poka-yoke IX Kaoru Ishikawa : Design of Experiments X Genichi Taguchi : Father of Quality Circles XI External Failure : Measuring and checking products to assure conformance to standards XII Shigeo Shingo : Four Absolutes of Quality XIII Masaaki Imai : Grand Father of Quality Control		
SECTION B **02x20 = 40 Marks** **(DO ANY TWO OF QUESTIONS : Q 02, Q03 and Q 04)**				
Q 02		Cost of Poor Quality study conducted at an Orthopedic Implants Company in Jaipur found that, in the previous year the internal failure costs alone is more than Rs. 11.5 crores; break up is given below. Do Pareto Analysis and identify candidate quality improvement projects	**20**	**CO 01**

Cost Heads	**Amount** in Rs.
Design Changes	333,000
Dispositions Scrap	2,473,000
Downtime	212,834
Excess Inventory Reserves	36,253,810
Excess Inventory Reserves Carrying Cost	5,075,533
Intermediate Stock Carrying Cost	2,269,540
Intermediate Stock Inventory	25,785,999
Investigation of Failure	445,536
Obsolete Inventory Reserves	11,552,776
Obsolete Inventory Reserves Carrying Cost	1,617,389
Production Rework	2,470,000
QC re-inspection indirect costs	642,114
Safety Stock	16,213,000
Safety Stock Carrying Cost	3,610,040
Vendor Rework Charges	115,000
T O T A L	**115,538,571**

Q 03		Discuss **<u>any two</u>** of the following; clearly write “Purpose”, “When to Use”, “How to Use”, “Benefits” and give “Example” a. Brain Storming b. Failure mode and effect analysis (FMEA) c. Error Proofing (Pokayoke)	**10** **10** **10**	**CO 02**

Q 04	Reed engineering Ltd. Is a high-end industrial valve manufacturing company established about two decades ago. They manufacture a variety of valves to cater to specific needs of different industry verticals and segments. Over the years, several competitors entered the market and Reed is now facing tough competition. This forced Reed to take a closer look into operating costs and reduce it. You have been invited, as a consultant to help them to reduce it. You requested for the following cost data and the same was made available to you. Please analyse the data, give your recommendations in a report for the Reed Management to consider.	**20**	**CO 01**

Quality Cost	**Product A**	**Product B**	**Product C**
Prevention	5,698	1,569	1,908
Appraisal	37,676	10,384	9,206
Internal Failure	119,107	60,876	63,523
External Failure	133,168	12,625	15,755
Total Sales	8,165,000	1,750,000	90,392
Total Labour Cost	5,800	5,650	4,585
No. of Machines	71	14	14

SECTION-C

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Award for having achieved a significant turn-around of its overall performance. A comprehensive quality improvement and cost-cutting initiative in September 2000 has played an important role in the company's turnaround, from a of Rs. 500 million in the year ending March 2001 to a profit of Rs 28 million in the first quarter of 2002-2001. Tata Motors has two main business segments: Commercial Vehicle Business Unit (CVBU) and Passenger Car Business Unit (PCBU).

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