NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

QUALITY ASSURANCE MANAGEMENT AND CONTROL

SCH 2211

Second Semester Examination Paper

May 2016

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements:

Examiner's Name: Mr D Dube

INSTRUCTIONS

1. Answer ALL questions from Section A
2. Answer any three (3) questions from Section B
3. Section A carries 40 marks
4. Each question from Section B carries 20 marks
5. Use graph paper to draw graphs
6. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
TOTAL POSSIBLE MARKS	**100**

SECTION A (Answer ALL questions. This section carries 40 marks)

1. Study the attached case and answer the following questions.
   a. Identify and explain the three change drivers at MLC. (6 marks)
   b. MLC made a "paradigm shift" in their marketing. How did this happen and what were the results? (6 marks)
   c. Calculate the average net profit before tax as a percentage of sales during the period 1993 – 1998 and comment on the company's performance. (7 marks)
   d. Comment on the following statement for industrialists "Innovate or perish." Cite practical examples. (7 marks)
   e. How would you advise MLC to proceed with implementation of TQM? What are the pitfalls they should guard against? (14 marks)

SECTION B (Answer all three (3) questions. Each question carries 20 marks)

2. Compare and contrast the approaches of the three American quality gurus, Deming, Juran and Crosby on the following factors:
   a. Definition of quality (5 marks)
   b. Management responsibility (5 marks)
   c. Performance standard (5 marks)
   d. Teamwork (5 marks)

3. a) McDaniel Shipyards wants to develop control charts to assess the quality of its steel plate. They take ten sheets of 25mm steel plate and compute the number of cosmetic flaws on each roll. Each sheet is 500mm by 2500mm. Based on the following data, develop limits for the control chart, plot the control chart, and determine whether the process is in control. (12 marks)

Sheet No.	No of defects	Sheet No.	No of defects
1	1	6	5
2	1	7	0
3	2	8	2
4	0	9	0
5	1	10	2

b) In an acceptance sampling plan developed for lots containing 1 000 units, the sample size *n* is 85 and *c* is 3. The percentage defective of incoming lots is 2%. Construct an OC curve and determine the probability of acceptance. (8 marks)

4. a) Citing at least 5 practical examples explain how creativity and creative thinking helps uplifting the standard of living of people in a country. (14 marks)

b) Explain Nonaka's knowledge creation and conversion model. (6 marks)

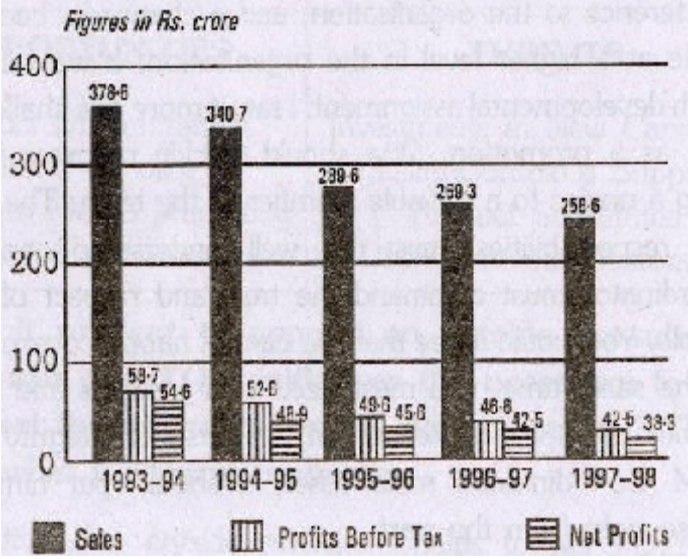
End of question Paper!!!

THE CASE

For decades, MCL has been known as a caustic soda company --- a perception that's bound to change soon. The imperatives of value addition and the nature of our production processes are forcing us to change tack. Today, our 13 per cent market-share makes us the second-largest producer of caustic soda in our country. Our manufacturing facilities are located at Vadodara, a city located in our main market Gujrat which consumes over 60 per cent of our production.

Caustic soda is obtained by the electrolysis of salt --- a process which also yields chlorine as a by-product. The ratio of caustic soda is usually 1:5:1 (Cl_2:NaOH:H_2), the combination is termed as an Electro-Chemical Unit (ECU). Caustic Soda and chlorine, incidentally, have separate markets. Paper, Aluminum, Textiles, and Soaps & Detergents are caustic soda's primary user-industries; chlorine is sold mostly to petrochemical units. They convert chlorine into ethylene dichloride or a vinyl chloride monomer, which is used to produce Poly-Vinyl Chloride (PVC) which, in turn, is used in the manufacture of plastics. As you see, the scope for value-addition lies in the chlorine component of an ECU. Surely, the price-realisation of an ECU is higher when there is greater emphasis on chlorination. But an increase in demand for chloride leads to glut in caustic soda.

There is an oversupply of caustic soda. Against a demand of 1:10 million tonnes per annum (tpa), the current capacity in the country stands at 2.20 million tpa --- not to mention the licenses issued for another 1 million tpa. With most producers operating at 50 per cent capacity, the situation is bad. For, caustic soda is a commodity business, where volumes are crucial; so, capacity utilisation is a critical parameter of profitability and cost-efficiency. Of course, MCL has some advantages. It has captive salt words, which meet 75 per cent of its requirements of sodium chloride, the main raw material, And it has an in-house power generation facility which offers power at Rs. 2.60 per unit against Rs. 4.70 from the state power grid. Naturally, since power constitutes 67 per cent of the cost of production, we are able to save a lot of money….
MCL's FINANCIAL



For decades, MCL has been in the commodity business. But the supply overhang in the caustic soda industry has forced us to look for alternative growth routes. We have taken 2 critical measures: consumer marketing and value-addition. We are increasing our salt-works capacity not only to meet 100 per cent of our raw material requirements from within, but to market branded salt to domestic consumers as well. This is a new area for us, and a paradigm shift in our conventional approach to marketing. Historically, we have always looked at chlorine as a byproduct. With opportunities for value addition opening up in the chlorine segment --- thanks to massive additions to petrochemical capacities in the country --- our new thrust is to look for ways in which MCL can add value to our customers' supply chain. That calls for a different marketing approach in which customer requirements, both current and future, become the focal point of all that we do. We asked ourselves: what would happen if we did not venture into these 2 areas? The answer was that, sooner or later we would be wiped out of business. That was the change-driver.

MCL has decided to implement Total Quality Management (TQM). But therein lies the crux of the issue: implementation is never easy. One has to be careful and cautions; it is the first few months that make all the difference to the success of an organizational transformation like TQM.