KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2011/2012

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (MANUFACTURING ENGINEERING)

EMM 502: QUALITY MANAGEMENT

DATE: Wednesday, 11th April, 2012 TIME: 8.00 a.m. – 10.00 a.m.

INSTRUCTIONS:

i) All questions carry equal marks

ii) There are **FIVE** questions in this paper.

iii) Answer any **THREE** questions.

QUESTION ONE

a) State five benefits of quality control

b) "Variation is meritable" and "sing observation form little or no basis for objective decision making" . Discuss.

c) By giving a relevant example of a process, discuss the procedure for controlling a process variability. From the example taken, show if the process is satisfactory and give appropriate comment.

QUESTION TWO

a) Give three statements to show that 'quality' is a relative term. (3 marks)

b) With suitable example discuss how you can develop a quality assurance plan. (7 marks)

c) The diameter of a water pipe is specified as D 20mm. An equipment is set to produce these pipes. Samples of five pipes taken from each hours production and

six sample observations produced the results given in table Q.2. Neglecting changes in length of the pipes, sketch R chart and $\overline{X}$ chart and show control limits, give the control chart factors: $A_2 = 0.6$, $D_3 = 1$ and $D_4 = 2.1$

(10 marks)

Table Q2

	Sample pipe diameter				
	1	2	3	4	5
1	19.5	19.8	19.6	20.4	20.1
2	20.1	19.8	20.3	19.7	19.6
3	20.0	20.4	20.5	19.9	20.0
4	19.9	20.4	20.5	19.9	20.0
5	19.8	19.2	19.7	20.4	20.3
6	20.3	20.0	19.4	20.2	19.6

QUESTION THREE

a) Discuss the difference between quality control and quality assurance

(6 marks)

b) Show the variation of probability of acceptance with shifting process mean on Operating Characteristic (OC) curves of control chart with subgroup size L, M and N, if L < M < n (5 marks)

c) An electronic consumer product company produces control switches to be used in desk top computers. The data in table Q3 describe inspection results for these switches during 1st quarter month of March 2012. Compute a percent defective control chart using 3σ control limits. (9 marks)

Table Q3

Date	Number inspected	No. defective
1	30	4
2	50	2
3	40	1
4	31	3
5	20	3
6	18	5
7	25	3
8	33	1

QUESTION FOUR

a) What is descriptive statistics? (4 marks)

b) Discuss evolution and implementation of Total Quality Management in industries (6 marks)

c) A quality control inspection at the Coca Cola Company has taken 10 samples with four observations each of the volume of bottles filled. The data is shown in table Q4. If the standard deviation of the bottling operation is 0.14 litres, use this information to develop control limits of three standard deviations for the bottling operation. (10 marks)

Table Q4

Sample Number	Observations bottle volume in litres			
	1	2	3	4
1	15.85	16.02	15.83	15.93
2	16.12	16.00	15.85	16.01
3	16.00	15.91	15.94	15.83
4	16.20	15.85	15.74	15.93
5	15.74	15.86	16.21	16.10
6	15.94	16.01	16.14	16.03
7	15.75	16.21	16.01	15.86
8	15.82	15.94	16.02	15.94
9	16.04	15.98	15.83	15.98
10	15.64	15.86	15.94	15.86

QUESTION FIVE

a) Give meaning of the following terms:-

i) Quality standard (1 mark)

ii) Quality inspection (1mark)

iii) Quality testing (1 mark)

iv) Quality certification (1 mark)

b) With suitable illustrations, discuss the changes in mean and dispersion of a given product sample (6 marks)

c) Three drilling machines at Nairobi steel works are being evaluated for their capability:

Drilling machine	Standard deviation
A	0.05
B	0.1
C	0.2

i) If the specifications are set between 0.248 and 0.262 m, determine which of the machines are capable of producing within specifications (5 marks)

ii) If the process mean is 0.250, determine the process capability of the machines identified in (i) (5 marks)