UNISA university of south africa

MNO2602

MAY/JUNE 2017 P2

QUALITY MANAGEMENT AND TECHNIQUES

STUDENT NUMBER									

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FOR USE BY EXAMINATION INVIGILATOR

Question No	Marks					
	Examiners					
	1		2		3	
Total						

Subject

Number of paper

Date of examination

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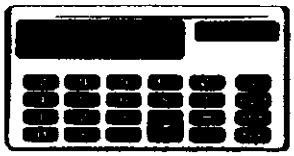
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

MNO2602

May/June 2017

QUALITY MANAGEMENT AND TECHNIQUES

Duration 2 Hours

70 Marks

EXAMINERS :

FIRST MR FJ HAMMANN
SECOND MR R DIRKSE VAN SCHALKWYK

Use of a non-programmable pocket calculator is permissible.

Closed book examination

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This examination paper consists of 25 pages, including 2 blank pages and 2 annexures

Contents		SECTION A *Compulsory*		SECTION B *Select only two questions*	
Section A	[10]	Question 1	[10]	Question 2	[30]
Section B	[60]			Question 3	[30]
				Question 4	[30]
Total for PAPER	[70]	Total for SECTION A	[10]	Total for SECTION B	2 x [30] = [60]

INSTRUCTIONS

- This is a fill-in examination paper All answers need to be written on the paper in the space provided
- Additional blank pages are provided at the end of the paper (see pp 22 - 23)
- The examination paper consists of two sections Section A is compulsory, consisting of 10 multiple choice questions Section B consists of three essay-type questions, of which you must answer only two
- Answers must be written neatly with a black or blue pen Only graphs or sketches may be done in pencil
- A formula sheet is included in Annexure A (see p 24)
- Control chart factors is included in Annexure B (see p 25)
- You are not allowed to remove any part of this examination paper from the examination venue
- Where applicable, show all your calculations and round off your answer to two decimal places

SUMMATIVE ASSESSMENT GUIDELINES:

- Please take careful consideration of the mark allocation and time limit **(ONLY 2 hours)**
- Do not waste time on one question, rather go on to the next one and come back later
- **READ** each question very carefully Make sure your answer reflects what has been asked
- Each question is in line with the module outcomes, there are not any surprises

[TURN OVER]

SECTION A

This section must be answered by ALL candidates Please answer ALL TEN multiple choice questions from Section A. Select only ONE option and write down the corresponding number in the space provided

Question 1 **[10]**

1 1 Which one of the following is not an example of a strategic content variable?

1 Time
2 Leadership
3 Quality costs
4 Generic strategies
5 Product development

(1)

Answer 1.1

1 2 Which two of the following statements are correct?

a) Services are distinguished from manufacturing on several dimensions, one of which is that many service attributes are intangible This means that they cannot be inventoried or carried in stock for long periods of time
b) There are 4 steps to developing a services blueprint, namely, identifying processes, isolating fail points, establishing a time frame and analysing competitors
c) If customers have higher expectations for tangibles than for reliability and customers perceive tangibles as being poor, a large gap exists between the expected and delivered performance on reliability
d) Gap 4 of the SERVQUAL model is the gap between service delivery and service quality expectations
e) A customer-benefits package consists of both tangibles that define the service and intangibles that make up the service

1 a, b
2 b, c
3 a, e
4 d, e
5 c, e

(1)

Answer 1.2

1 3 Which one of the following is the type of environment that changes when firms locate themselves near or far away from natural resources?

1 Economic
2 Task
3 Physical
4 Global
5 Social (1)

Answer 1.3

1 4 Which three of the following statements are correct?

a) The goal of financial benchmarking is to perform financial analysis and compare the results in an effort to assess your overall competitiveness
b) In benchmarking, it is important to understand only the target firm's key business factors
c) Business process benchmarking is based on the concept of 5w2h It is labelled as such because a business process benchmarking project should result in the answers to seven questions· who, what, when, where, why, how and how much
d) Benchmarking comprises ten steps Recalibrating the benchmark is one of the steps which mean that benchmarking is a one-off process with the best firms
e) Two factors are critical to achieving success through reengineering: breadth and depth

1 a, c, e
2 a, b, c
3 c, d, e
4 b, d, e
5 a, d, e

(1)

Answer 1.4

1 5 What is the major theoretical contribution of Kaoru Ishikawa?

1 The concept of benchmarking
2 His assertion that the entire organisation should be involved in improving quality
3 The zero-defects approach to quality improvement
4 His emphasis on total involvement of the operating employees in improving quality
5 The quality loss function and the concept of robust design (1)

Answer 1.5

1 6 A quality engineer in charge of a coffee filter pack production line was concerned about the weight of the filter packs being produced The quality team sampled three packs every hour, throughout the production day The table below shows the results, where the weight of each filter pack is measured in grams

Sample number	Weight (g)		
1	20 4	20 9	20 5
2	19 9	19 8	20 1
3	20 4	21 0	21 1
4	21 3	22 0	21 2
5	21 2	20 9	19 7

Calculate the upper and lower control limits for an $\bar{x}$ chart

1 There is not enough information to calculate the control limits
2 UCL = 21 74, LCL = 20 92
3 More samples are needed to calculate the control limits
4 UCL = 21 47, LCL = 19 92
5 UCL = 20 69, LCL = 0 (1)

Answer 1.6

1 7 Suppose a product has a failure rate of 0 01 per operating hour and a useful life of 200 hours **Calculate** the reliability of this product

1 The product's useful life is not enough to perform such a calculation
2 2 0
3 0 135
4 0 865
5 0 153 (1)

Answer 1.7

1 8 Which one of the following types of teams is assigned to work on a specific problem for a limited amount of time?

1 Temporary teams
2 Cross-functional teams
3 Time management teams
4 Self-directed work teams
5 Tiger teams (1)

Answer 1.8

1 9 Consider the following building blocks for the system of quality improvement Which one of these building blocks represents the core of a company's capabilities?

1 Processes
2 Information and finance
3 Closeness to customers
4 People
5 All of the above (1)

Answer 1.9

1 10 The Shop Brite chain of grocery stores decided to monitor customer complaints This is an important part of their customer satisfaction improvement programme They collected data relating to certain types of problems and compiled the following check sheet.

Type of Problem	Frequency
Defective product	13
Product too expensive	9
Shortage of tellers	20
Unhelpful shop assistants	5
Vegetables not fresh	3

When constructing a Pareto chart, how many of these types of problems will account for 80% or more of the complaints received?

1 One
2 Two
3 Three
4 Four
5 Five (1)

Answer 1.10

Subtotal for Question 1 = [10]

Subtotal for Section A = [10]

SECTION B

This section consists of three questions for 30 marks each Select any two questions to answer from Section B Write each answer neatly in the space provided Additional writing space is provided at the end of the paper (pp 22-26)

Question 2 **[30]**

2 1 There are several definitions or dimensions of quality **Identify** and **explain** Garvin's five definitions of quality (5)

2 2 A guarantee takes into account customer rights The guarantee promotes the confidence about the purchase of the product **Provide** and **explain** the various conditions that a guarantee should adhere to (5)

2 3 Step 3 in the product development process includes a technology feasibility statement What **issues** does the technology feasibility statement assess? (5)

2 4 Supa Service Inc is an automotive service centre who guarantees that customers can have their car's oil change in less than 40 minutes The manager monitors the time it takes to complete this task by sampling three cars each hour throughout a randomly chosen working day The total time (in minutes) to complete an oil change for each car are recorded The results are shown below

Hour	Time (min)		
1	30	32	35
2	34	35	36
3	34	33	30
4	32	36	33
5	32	29	35
6	37	46	33
7	30	38	27

The manager appointed a statistician who calculated the control limits for an $\bar{x}$ chart as follows LCL = 27 11, $\bar{\bar{x}} = 33.67$ and UCL = 40 22

Draw and **interpret** the $\bar{x}$ chart in order to assist the manager of Supa Service Inc (5)

2 5 The design specifications of a pressed tablet require specification limits of 64 50 + 1 25 mg The process is stable with a mean of 64 70 mg and a standard deviation of 0 43 mg
Calculate the capability index (2)

2 6 Briefly **explain** the Six Sigma concept (3)

2 7 **Name** and briefly **discuss** the main ingredients to an audit (5)

Subtotal for Question 2 = [30]

Question 3 **[30]**

3 1 Leadership is the process by which a leader influences a group to move towards the attainment of superordinate goals For followers to have power, leadership must share its power Briefly **explain** the various forms of this power (5)

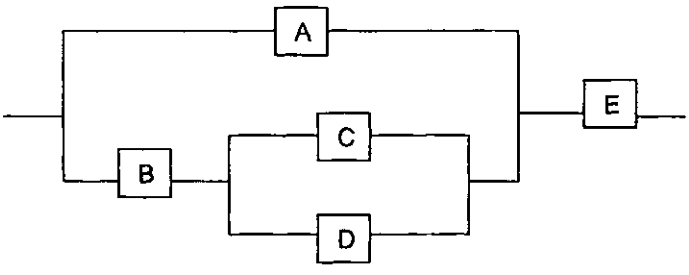
3 2 **Identify** and **explain** any five of the most commonly benchmarked performance measures (10)

3 3 A manufacturer of tennis racquets subjects their racquets to several quality checks to ensure that the racquets have no defects such as inaccurate head size or unstable grommets The table below shows the number of defective racquets found in eight samples of 50 racquets each

Sample number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Number of defective racquets	2	3	5	4	2	6	5	3

Calculate the control limits for a *p* chart (6)

3 4 A system consists of five components, connected as follows



The reliability of the components is shown below **Determine** the reliability of the system

Component	A	B	C	D	E
Reliability	0 87	0 95	0 88	0 92	0 91

(4)

3 5 **Name** and briefly **explain** the steps during the third phase of the DMAIC process (5)

Subtotal for Question 3 = [30]

Question 4 **[30]**

4 1 Compare Deming's, Juran's and Crosby's perspectives of quality management What are the major similarities and differences between their perspectives? (8)

4 2 The CEO of your company asked you to explain "service blueprinting" to the board of directors Write a short report on this topic, with a focus on the following (5)

(a) **Explain** the term "service blueprinting" {1}
(b) **Provide** the four steps in developing a service blueprint {4}

4 3 By globalising, organisations considerably change the physical environment, the task environment and the social environment **Explain** the social environment of a globalising organisation (2)

4 4 The following dataset contains the number of defects found on each of 12 randomly chosen bicycle frames manufactured by Luigi Bikes Inc over a period of two weeks

5	7	15	9
19	8	16	16
9	5	7	10

Construct a histogram in order to present the quality manager of Luigi Bikes Inc with a graphical representation of the data (4)

4.5 **Name** the steps to follow when implementing the fourth phase of the quality circle process (6)

4 6 Briefly **describe** the stages of a team's development (5)

Subtotal for Question 4 = [30]

Subtotal for section B = [60]
Total for paper = [70]

Blank pages for additional writing

You can make use of the space provided below, if needed Please number all your answers clearly and leave a line open between each answer

ANNEXURE A: Formula sheet

$$R(t) = e^{-\lambda t}$$

$$\bar{x} = \sum x_i / n$$

$$\bar{R} = \sum R_i / k$$

$$\bar{\bar{x}} = \sum \bar{x}_i / k$$

$$LCL_{\bar{x}} = \bar{\bar{x}} - A_2 \bar{R}$$

$$UCL_{\bar{\bar{x}}} = \bar{\bar{x}} + A_2 \bar{R}$$

$$\text{Cpu} = (\text{USL} - \mu)/3\hat{\sigma}$$

$$\text{Cpl} = (\mu - \text{LSL})/3\hat{\sigma}$$

$$\text{Cpk} = \min\{\text{Cpu},\ \text{Cpl}\}$$

$$\bar{p} = \sum p_i / k$$

$$LCL_p = \bar{p} - 3\sqrt{\bar{p}(1-\bar{p})/n}$$

$$UCL_p = \bar{p} + 3\sqrt{\bar{p}(1-\bar{p})/n}$$

$$R_s = R_1 \cdot R_2 \ R_3 \cdot \ldots \ R_n$$

$$R_p = 1 - (1 - R_1)(1 - R_2) \ldots (1 - R_n)$$

$$k \geq \log n / \log 2$$

$$class\ width = \frac{range}{k}$$

ANNEXURE B: Factors for determining control limits

n = Number of observations in subgroup	A_2	E_2	D_3	D_4
2	1 88	2 66	0	3 27
3	1 02	1 77	0	2 57
4	0 73	1 46	0	2 28
5	0 58	1 29	0	2 11
6	0 48	1 18	0	2 00
7	0 42	1 11	0 08	1 92
8	0 37	1 05	0 14	1 86
9	0 34	1 01	0 18	1 82
10	0 31	0 98	0 22	1 78
11	0 29		0 26	1 74
12	0 27		0 28	1 72
13	0 25		0 31	1 69
14	0 24		0 33	1 67
15	0 22		0 35	1 65
16	0 21		0 36	1 64
17	0 20		0 38	1 62
18	0 19		0 39	1 61
19	0 19		0 40	1 60
20	0 18		0 41	1 59

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ID Number

Batch No
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Signature of invigilator

UNISA invigilator's personnel number

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