UNIVERSITY OF JOHANNESBURG

FACULTY OF ENGINEERING AND BUILT ENVIRONMENT

Main 2018

DEPARTMENT OF QUALITY AND OPERATIONS MANAGEMENT

PROGRAMME	ND: OPERATIONS MANAGEMENT ND: MANAGEMENT SERVICES
MODULE	QUALITY ASSURANCE 2A
CODE	OQA2A01 / QAS22A2
DATE	12 June 2018
DURATION	3 HOURS
TIME	12h30 – 15h30
TOTAL MARKS	100

EXAMINER	DR N SUKDEO
INTERNAL MODERATOR	MR Y MULONGO
EXTERNAL MODERATOR	N/A
NUMBER OF PAGES	5 PAGES including cover page

INSTRUCTIONS TO CANDIDATES:

- Please answer all questions.
- Question papers must not be handed in.
- This is a closed book assessment.
- Read the questions carefully and answer only what is asked.
- Number your answers clearly.
- Write neatly and legibly.
- Structure your answers by using appropriate headings and sub-headings.
- The general University of Johannesburg policies, procedures and rules pertaining to written exam apply.

...Cont/

QUESTION ONE

1.1 Illustrate and explain the three spheres of quality. [6]

1.2 List Philip Crosby's absolutes of quality management. [5]

1.3 Elaborate on each criteria in Figure 1. [7]

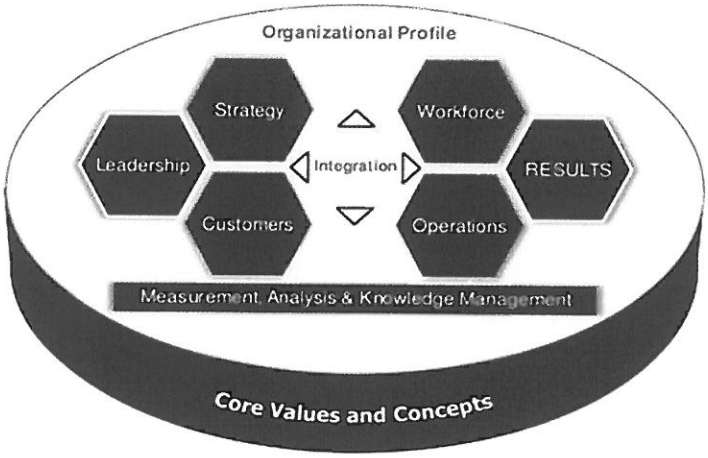

Figure 1

1.4 What are Shingo's seven types of waste? [7]

1.5 For followers to have power, leadership must share its power. Identify and explain the types of power. [5]

[30]

QUESTION TWO

2.1 Construct a service blueprint for a restaurant of your choice. Indicate one possible fail points. [5]

2.2 Mention the benefits of FMEA. [5]

2.3 Evaluate the phases of the customer life cycle. [7]

2.4 Distinguish between:

2.4.1 geometric modelling and engineering analysis [2]

2.4.2 voluntary services and involuntary services [2]

2.5 Explain the concepts of Design for Maintainability. [6]

2.6 Excaliber manufacturing has gathered the following quality-related cost data:

ANNUAL QUALITY COSTS		
Failure costs	R	
Defective products		24 000
Engineering scrap		24 000
Non-engineering scrap		26 500
Consumer adjustments		27 500
TOTAL		
Appraisal costs	R	
Receiving inspection		11 400
Line 1 inspection		10 500
Line 2 inspection		8 000
Spot checking		11 300
TOTAL		
Prevention costs	R	
Quality training		27 500
Process engineering		
Corporate		45 000
Plant		45 300
Product redesign		10 000
TOTAL		

Compute the following:

2.6.1 Total failure costs [1]

2.6.2 Total appraisal costs [1]

2.6.3 Total prevention costs [1]

2.6.4 Ratio of appraisal to failure costs [1]

2.6.5 Ratio of prevention to failure costs [1]

2.6.6 Ratio of prevention and appraisal to failure costs [1]

2.6.7 Proportion of total quality costs [1]

2.6.8 Recommend what the company should do upon the findings of the failure costs. [1]

[35]

QUESTION THREE

3.1 A small local supermarket has identified that there is a serious concern of workers arriving late at work. The manager would like to determine the cause of late arrivals at work. Develop a cause and effect diagram to assist the manager in identifying potential causes of the late arrivals of staff members. [8]

3.2 You work for a prominent consulting agency with an office located in Auckland Park, Johannesburg. You work with a team of 20 professionals from this office. Over the past several months, your team leader has collected data from your team regarding the effectiveness of your team meetings. The data is represented below:

Comments on team meetings	***Frequency***
There is no formal meeting agenda	22
Agenda not distributed before the meeting	7
Meetings are too long	11
Some people dominate the meetings	4
Meetings do not start on time	33
Miscellaneous	3

3.2.1 Construct a pareto diagram. [7]

3.2.2 Discuss the benefits of utilising a pareto diagram. [3]

3.3 Elaborate on the benefits of Figure 2. [4]

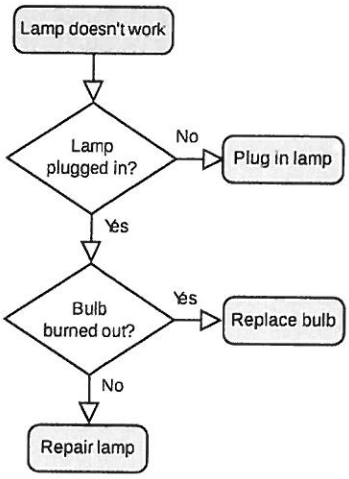

Figure 2

3.4 Valtec Electronics fills orders for its electronic components and parts by truck, to customers through several distribution centers. A measure of its supply chain responsiveness is order fulfillment lead time, which is the number of days from when the company receives an order to when it is delivered to the customer. A distribution center manager has taken 20 samples of 5 orders each day during the month and recorded the lead time for each as follows:

Construct an x-chart to be used in conjunction with an R-chart using 3σ control limits for this data set. [13]

	x	R
1	1.84	2.3
2	2.08	2.6
3	2.92	2.7
4	1.78	1.3
5	2.70	3.2
6	3.50	5.0
7	2.84	2.2
8	3.26	4.6
9	2.50	1.3
10	4.14	3.5
11	2.12	3.0
12	4.38	4.0
13	2.84	3.3
14	2.70	1.1
15	3.56	5.6
16	2.96	3.1
17	3.34	6.1
18	4.16	2.4
19	3.70	2.5
20	2.72	2.9

[35]

Total = 100 marks

Control Limits for p*-Charts*

$$\text{UCL} = \bar{p} + z\sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$$

$$\text{LCL} = \bar{p} - z\sqrt{\frac{\bar{p}(1 - \bar{p})}{n}}$$

Control Limits for c*-Charts*

$$\text{UCL} = \bar{c} + z\sqrt{\bar{c}}$$

$$\text{LCL} = \bar{c} - z\sqrt{\bar{c}}$$

Control Limits for R*-Charts*

$$\text{UCL} = D_4\bar{R}$$

$$\text{LCL} = D_3\bar{R}$$

Control Limits for $\bar{x}$*-Charts*

$$\text{UCL} = \bar{\bar{x}} + A_2\bar{\bar{R}}$$

$$\text{LCL} = \bar{\bar{x}} - A_2\bar{\bar{R}}$$

Factor for Determining from $\bar{R}$ the Three-Sigma Control Limits for $\bar{X}$- and R-Charts

Number of Observations in Each Sample	Factor for $\bar{X}$-Chart	Factors for R-Chart	
		Lower Control Limit	Upper Control Limit
n	A_2	D_3	D_4
2	1.88	0	3.27
3	1.02	0	2.57
4	0.73	0	2.28
5	0.58	0	2.11
6	0.48	0	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	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