Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	:	TOTAL QUALITY MANAGEMENT
COURSE CODE	:	BPB 20803
PROGRAMME CODE	:	BPA
EXAMINATION DATE	:	JUNE / JULY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 **Table Q1(a)** tabulates the data captured from a production run, where three samples were taken during each five shifts, while **Table Q1(b)** in the APPENDIX 1 tabulates the control chart constants.

Table Q1 (a): Readings of observations

Subgroup	Sample		
	1	2	3
1	11.1	9.2	11.3
2	10.1	11.2	9.9
3	9.8	10.2	9.9
4	11.3	10.1	10.1
5	11.2	9.4	8.9

(a) Calculate:

(i) x-bar

(2 marks)

(ii) x-double bar

(2 marks)

(iii) R

(2 marks)

(iv) R-bar

(2 marks)

(v) $UCL_{x\text{-}bar}$

(3 marks)

(vi) $LCL_{x\text{-}bar}$

(3 marks)

(vii) UCL_R

(3 marks)

(viii) LCL_R

(3 marks)

(b) Plot the x-bar chart on the graph paper based from the answers in **Q1(a)(i)**, **Q1(a)(ii)**, **Q1(a)(v)** and **Q1(a)(vi)**.

(5 marks)

(c) Plot the R chart on the graph paper based from the answers in **Q1(a)(iii)**, **Q1(a)(iv)**, **Q1(a)(vii)** and **Q1(a)(viii)**.

(5 marks)

(d) Analyze both the x-bar chart and R chart drawn in **Q1(b)** and **Q1(c)**.

(6 marks)

(e) Discuss **TWO (2)** situations of the process capability for both the x-bar chart and R chart drawn in **Q1(b)** and **Q1(c)**.

(4 marks)

Q2 A paper manufacturer monitors the number of pitch marks in square foot samples of paper off the paper machine. The number of pitch marks for each sample is recorded in **Table Q2** for 15 consecutive samples.

Table Q2: Number of defects

Sample	Defects
1	8
2	12
3	6
4	9
5	3
6	8
7	14
8	10
9	12
10	7
11	10
12	2
13	7
14	6
15	16

(a) Determine the $\bar{c}$.

(3 marks)

(b) Calculate the upper control limit and lower control limit.

(6 marks)

(c) Using the information from **Q2(a)**, **Q2(b)** and **Table Q2**, draw and plot the c chart on the graph paper.

(7 marks)

(d) Determine whether the points are out of control.

(4 marks)

Q3 (a) Define process capability with an example.

(4 marks)

(b) Compare **THREE (3)** characteristics of variable and attribute control charts.

(6 marks)

(c) Identify **TWO (2)** functions of multi-vari chart.

(4 marks)

(d) Describe **THREE (3)** types of chart applicable for short runs.

(6 marks)

Q4 (a) List **THREE (3)** phases of total quality implementation.

(3 marks)

(b) Discuss **THREE (3)** infrastructures that support deployment and continual improvement.

(9 marks)

(c) Illustrate **FOUR (4)** steps in the planning stage of total quality implementation process.

(8 marks)

– END OF QUESTIONS –

FINAL EXAMINATION

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APPENDIX 1

Table Q1 (b): Table of Control Chart Constants

	X-bar Chart Constants	for sigma estimate	R Chart Constants		S Chart Constants	
Sample Size = m	A_2	A_3	d_2	D_3	D_4	B_3	B_4
2	1.880	2.659	1.128	0	3.267	0	3.267
3	1.023	1.954	1.693	0	2.574	0	2.568
4	0.729	1.628	2.059	0	2.282	0	2.266
5	0.577	1.427	2.326	0	2.114	0	2.089
6	0.483	1.287	2.534	0	2.004	0.030	1.970
7	0.419	1.182	2.704	0.076	1.924	0.118	1.882
8	0.373	1.099	2.847	0.136	1.864	0.185	1.815
9	0.337	1.032	2.970	0.184	1.816	0.239	1.761
10	0.308	0.975	3.078	0.223	1.777	0.284	1.716
11	0.285	0.927	3.173	0.256	1.744	0.321	1.679
12	0.266	0.886	3.258	0.283	1.717	0.354	1.646
13	0.249	0.850	3.336	0.307	1.693	0.382	1.618
14	0.235	0.817	3.407	0.328	1.672	0.406	1.594
15	0.223	0.789	3.472	0.347	1.653	0.428	1.572
16	0.212	0.763	3.532	0.363	1.637	0.448	1.552
17	0.203	0.739	3.588	0.378	1.622	0.466	1.534
18	0.194	0.718	3.640	0.391	1.608	0.482	1.518
19	0.187	0.698	3.689	0.403	1.597	0.497	1.503
20	0.180	0.680	3.735	0.415	1.585	0.510	1.490
21	0.173	0.663	3.778	0.425	1.575	0.523	1.477
22	0.167	0.647	3.819	0.434	1.566	0.534	1.466
23	0.162	0.633	3.858	0.443	1.557	0.545	1.455
24	0.157	0.619	3.895	0.451	1.548	0.555	1.445
25	0.153	0.606	3.931	0.459	1.541	0.565	1.435