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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023**

- COURSE NAME : QUALITY CONTROL
- COURSE CODE : BPB 24303
- PROGRAMME CODE : BPB
- EXAMINATION DATE : JULY / AUGUST 2023
- DURATION : 2 HOURS AND 30 MINUTES
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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TERBUKA

- Q1** (a) Develop Plan, Do, Check and Action (PDCA) using general process map with appropriate basic quality control (QC) tools and new quality control (QC) tools. (10 marks)
- (b) QSR company has problem in its production department as shown in **Table Q1(b)**. Brainstorming has been made amongst employees to identify the actual causes of rejected unit as presented in **Table Q1(b)**.

Table Q1(b): Causes of rejected unit

NO	CAUSES	QUANTITY
1	Machine breakdown	50
2	Part failure	30
3	Work instruction diagram	5
4	Workplace unorganised	3
5	Design problem	3
6	Work miss	3
7	Plastic part bending	2
8	SOP problem	2
9	Lack of co-operation	1
10	Lack of awareness	1

Based on **Table Q1(b)**

- (i) Draw Ishikawa diagram. (6 marks)
- (ii) Explain the applicability of 80/20 rule for this problem. (3 marks)
- (iii) Propose **TWO (2)** solutions for improvement based on main cause as stated in **Table Q1(b)** using Tree Diagram. (6 marks)

Q2 Measurement data for the np chart collected is shown in **Table Q2**.

Table Q2: Measurement Data for np chart

SAMPLE	SAMPLE QUANTITY	DEFECTS	PROPOSITION
1	100	13	0.13
2	100	14	0.14
3	100	12	0.12
4	100	11	0.11
5	100	8	0.08
6	100	9	0.09
7	100	17	0.17
8	100	9	0.09
9	100	10	0.10
10	100	1	0.01
11	100	12	0.12
12	100	18	0.18
13	100	7	0.07
14	100	13	0.13
15	100	14	0.14
16	100	12	0.12
17	100	11	0.11
18	100	8	0.08
19	100	9	0.09
20	100	17	0.17
21	100	18	0.18
22	100	20	0.20
23	100	25	0.25
24	100	18	0.18
25	100	15	0.15
26	100	15	0.15
27	100	28	0.28
Sum			

Calculate:

- (a) \bar{P} (2 marks)
- (b) \bar{n} (2 marks)
- (c) Upper Control Limit (UCL). (3 marks)
- (d) Lower Control Limit (LCL). (3 marks)



- (e) Construct np chart based on **Table Q2**. (10 marks)
- (f) Justify the np chart based on the result in **Q2(e)**. (5 marks)

Q3 Measurement data for the X chart collected is shown in **Table Q3**.

Table Q3: Measurement Data for X chart

SUBGROUP NUMBER	DATE	TIME	MEASUREMENTS				AVERAGE	RANGE
			X1	X2	X3	X4	X	R
1	04-Feb	8:00	37	40	32	39	37.00	8.00
2		9:00	49	44	39	42	43.50	10.00
3		10:00	37	41	35	37	37.50	6.00
4		11:00	41	55	43	42	45.25	14.00
5		12:00	39	40	44	40	40.75	5.00
6	05-Feb	8:00	42	42	43	34	40.25	9.00
7		9:00	44	39	41	46	42.50	7.00
8		10:00	33	42	38	36	37.25	9.00
9		11:00	60	50	47	48	51.25	13.00
10		12:00	47	43	36	42	42.00	11.00
11	06-Feb	8:00	38	41	39	38	39.00	3.00
12		9:00	37	37	41	37	38.00	4.00
13		10:00	40	38	47	35	40.00	12.00
14		11:00	38	39	45	42	41.00	7.00
15		12:00	60	50	50	54	53.50	10.00
16	07-Feb	8:00	30	32	29	32	30.75	3.00
17		9:00	41	40	29	34	36.00	12.00
18		10:00	38	44	28	58	42.00	30.00
19		11:00	35	41	37	38	37.75	6.00
20		12:00	56	55	45	48	51.00	11.00
21	08-Feb	8:00	38	40	45	37	40.00	8.00
22		9:00	39	42	35	40	39.00	7.00
23		10:00	42	39	39	36	39.00	6.00
24		11:00	43	36	35	38	38.00	8.00
25		12:00	39	38	43	44	41.00	6.00
Sum								

(a) Calculate:

(i) $\bar{\bar{X}}$ (3 marks)

(ii) \bar{R} (3 marks)

(iii) Upper Control Limit (UCL_x). (3 marks)

(iv) Lower Control Limit (LCL_x). (3 marks)

(v) Upper Control Limit (UCL_R). (3 marks)

(b) Construct X bar chart based on **Table Q3**. (10 marks)

Q4 (a) Discuss **THREE (3)** types of phase in life history curve. (6 marks)

(b) GMX company has received many reliability claims from customers after using within three month of their product.

Propose **ONE (1)** main solution of testing for monitoring and detecting the intial problems. (3 marks)

(c) A system has five components, P_1, P_2, P_3, P_4 and P_5 , with reliability values of 0.995, 0.982, 0.879, 0.699, 0.580 respectively.

Calculate the system reliability if the components are in series. (3 marks)

(d) A system of circuit has six components, A, B, C, D, E and F, with reliability values of 0.672, 0.667, 0.688, 0.688, 677 and 0.676, respectively.

Calculate the system reliability if the components are in parallel. (3 marks)

(e) Calculate the reliability of the system in **Figure Q4(e)**. (4 marks)

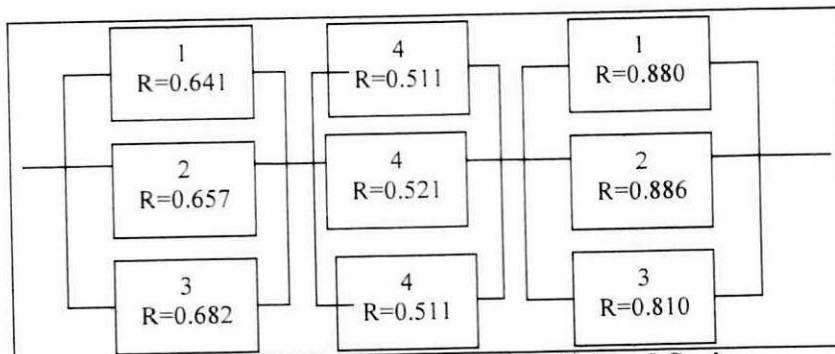


Figure Q4(e): Reliability in Parallel and Series

(f) Life test result shows that six of the units failed after 40, 45, 50, 55, 56 and 70 hours, respectively. Life test has been conducted to 100 units of LCD TV. 94 units were still operating at the end of 300 hours.

Calculate:

(i) Failure rate at the end of 300 hours. (3 marks)

(ii) Mean life based on failure rate from **Q4(f)(i)**. Assume that there is a constant failure rate for the test. (3 marks)

-END OF QUESTIONS-