



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019**

COURSE NAME : QUALITY CONTROL
COURSE CODE : BPB 24303
PROGRAMME : 2 BPB
EXAMINATION DATE : JUNE / JULY 2019
DURATION : 2 HOURS AND 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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- Q1** (a) Develop a flow-chart starting from identifying problem until evaluating proposed solutions with appropriate basic seven QC tools and new seven QC tools in each step. (10 marks)
- (b) Armada company has problem in their production line as shown in **Table Q1**. Quality control team has identified the actual causes of the problems as presented in **Table Q1**.
- (i) Draw Ishikawa diagram based on man, machine, method, material and environment (4M1E) from **Table Q1**. (6 marks)
- (ii) Explain the applicability of 80/20 rule for this problem based on the result in question **Q1(b)(i)**. (3 marks)

Table Q1: Actual Causes of Production Line

No	Causes	Quantity
1	Workplace unorganised	50
2	Machine breakdown	30
3	Workplace problem	5
4	Panel fail	3
5	Workmiss amongst employees	3
6	SOP problem	3
7	Plastic part bending	2
8	Improper schedule for 5S	2
9	Lack of co-operation	1
10	Lack of awareness	1

- (c) Propose **THREE (3)** solutions for improvement based on main causes as stated in **Table Q1** using Tree Diagram. (6 marks)

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

Table Q2: P chart

SAMPLE	SAMPLE QUANTITY	DEFECTS	PROPOSITION
1	168	50	0.30
2	149	66	0.44
3	148	67	0.45
4	126	60	0.48
5	163	57	0.35
6	172	59	0.34
7	86	35	0.41
8	170	69	0.41
9	155	54	0.35
10	125	62	0.50
11	111	70	0.63
12	116	58	0.50
13	92	60	0.65
14	98	68	0.69
15	162	54	0.33
16	200	62	0.31
17	230	70	0.30
18	200	58	0.29
19	98	30	0.31
20	200	68	0.34
21	100	54	0.54
22	100	62	0.62
23	180	70	0.39
24	300	58	0.19
25	125	30	0.24
26	110	68	0.62
27	166	54	0.33
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) Draw P chart based on **Table Q2**.
(10 marks)
- (f) Analyse the P chart whether the process is stable or not based on the result in **Q2(e)**
(5 marks)

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

Table Q3: X chart

SUBGROUP NUMBER	DATE	TIME	MEASUREMENTS				AVERAGE	RANGE
			X1	X2	X3	X4	X	R
1	02-Feb	8:00	28	33	24	30	28.75	9.0
2		9:00	39	30	29	33	32.75	10.0
3		10:00	26	32	26	28	28.00	6.0
4		11:00	61	56	60	51	57.00	10.0
5		12:00	30	26	36	32	31.00	10.0
6	03-Feb	8:00	34	33	35	26	32.00	9.0
7		9:00	36	33	33	38	35.00	5.0
8		10:00	25	33	30	28	29.00	8.0
9		11:00	40	36	39	37	38.00	4.0
10		12:00	39	35	28	34	34.00	11.0
11	04-Feb	8:00	30	33	31	30	31.00	3.0
12		9:00	29	29	33	29	30.00	4.0
13		10:00	32	30	39	27	32.00	12.0
14		11:00	30	31	37	34	33.00	7.0
15		12:00	42	34	35	37	37.00	8.0
16	05-Feb	8:00	25	27	21	31	26.00	10.0
17		9:00	33	32	21	26	28.00	12.0
18		10:00	30	36	20	50	34.00	30.0
19		11:00	27	33	29	30	29.75	6.0
20		12:00	48	47	37	40	43.00	11.0
21	06-Feb	8:00	30	32	37	29	32.00	8.0
22		9:00	31	34	27	32	31.00	7.0
23		10:00	34	31	31	28	31.00	6.0
24		11:00	35	28	27	30	30.00	8.0
25		12:00	31	30	35	36	33.00	6.0
Sum								

Calculate:

- (a) $\bar{\bar{X}}$ (3 marks)
- (b) \bar{R} (3 marks)
- (c) Upper Control Limit (UCL_x). (3 marks)
- (d) Lower Control Limit (LCL_x). (3 marks)
- (e) Upper Control Limit (UCL_R). (3 marks)
- (f) Draw X bar chart based on **Table Q3**. (10 marks)

Q4 (a) Explain the differences between debugging phase and wear out phase in reliability curve. (3 marks)

(b) GTB company has received many warranty claims from customers within one month after using their product.

Propose **TWO (2)** types of test for monitoring the initial failure of product. (6 marks)

(c) A system has six components, A, B, C, D, E and F, with reliability values of 0.885, 0.982, 0.879, 0.799, 0.980 and 0.919, respectively.

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

(d) A system has three components, A, B and C, with reliability values of 0.972, 0.977 and 0.976, respectively.

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

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

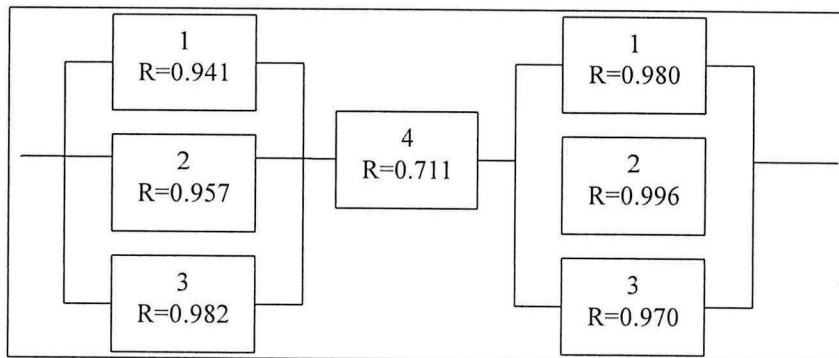


Figure Q4: Reliability in Parallel and Series

(f) Life test result shows that six of the units failed after 20, 30, 40, 45, 46 and 60 hours, respectively. Life test has been conducted to 20 units of LCD TV. Fourteen units were still operating at the end of 250 hours.

(i) Calculate the failure rate at the end of 250 hours. (3 marks)

(ii) Calculate the 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-