



# UTHM

Universiti Tun Hussein Onn Malaysia

## UNIVERSITI TUN HUSSEIN ONN MALAYSIA

### FINAL EXAMINATION SEMESTER II SESSION 2016/2017

COURSE NAME : QUALITY CONTROL  
COURSE CODE : BPB 24303  
PROGRAMME CODE : BPB  
EXAMINATION DATE : JUNE 2017  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

- Q1**
- (a) Develop an affinity diagram for causes related to UTHM bus transportation problem based on 4M1E. (10 marks)
  - (b) Develop an interrelationship diagram for the causes stated in **Q1(a)**. (5 marks)
  - (c) Propose **FIVE (5)** solutions for improvement based on two main causes as stated in **Q1(b)** using Tree Diagram. (10 marks)

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

**Table Q2:** Sample and defect quantity

SAMPLE	SAMPLE QUANTITY	DEFECTS	PROPOSITION
1	100	50	0.50
2	120	70	0.58
3	110	67	0.61
4	142	60	0.42
5	100	57	0.57
6	98	59	0.60
7	76	35	0.46
8	125	69	0.55
9	100	54	0.54
10	125	62	0.50
11	111	70	0.63
12	116	58	0.50
13	92	30	0.33
14	98	68	0.69
15	162	54	0.33
16	87	62	0.71
17	105	70	0.67
18	110	58	0.53
19	98	30	0.31
20	96	68	0.71
21	100	54	0.54
22	100	62	0.62
23	97	70	0.72
24	122	58	0.48
25	125	30	0.24
26	110	68	0.62
27	100	54	0.54
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 whether the process is stable or not based on P chart result in **Q2(e)**. (5 marks)

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

**Table Q3: Sample for Control chart**

SUBGROUP NUMBER	DATE	TIME	MEASUREMENTS				AVERAGE	RANGE
			X1	X2	X3	X4	X	R
1	02-Feb	8:00	41	33	24	30	32.00	17.0
2		9:00	40	30	29	33	33.00	11.0
3		10:00	31	32	26	28	29.25	6.0
4		11:00	30	56	60	51	49.25	30.0
5		12:00	33	26	36	32	31.75	10.0
6	03-Feb	8:00	31	33	35	26	31.25	9.0
7		9:00	42	33	33	38	36.50	9.0
8		10:00	26	33	30	28	29.25	7.0
9		11:00	34	36	39	37	36.50	5.0
10		12:00	31	35	28	34	32.00	7.0
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	30	33	30	31	31.00	3.0
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	36	36	37	40	37.25	4.0
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) Illustrate life history curve with three phases. (3 marks)

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

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

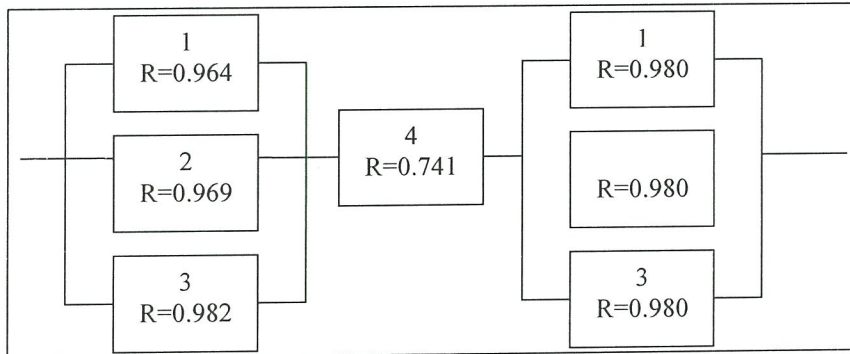
(c) A circuit has 7 components, A, B, C, D, E, F and G, with reliability values of 0.885, 0.963, 0.896, 0.849, 0.950, 0.940 and 0.939, respectively.

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

(d) A system has 4 components, A, B, C and D, with reliability values of 0.992, 0.947, 0.930 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 system

(f) Life test has been conducted to 20 units of LCD TV. The result shows that five of the units failed after 20, 30, 40, 45 and 60 hours, respectively. Fifteen units were still operating at the end of 100 hours.

(i) Calculate the failure rate at the end of 100 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-**

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