UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016

COURSE NAME : QUALITY CONTROL

COURSE CODE : BPB 24303

PROGRAMME : BPB

EXAMINATION DATE : JUNE / JULY 2016

DURATION : 3 HOURS

INSTRUCTION : ANSWER **ALL** QUESTIONS

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

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)   Discussion has been made amongst employees to identify the actual causes as presented in **Table Q1.**

(i)   Draw Ishikawa diagram chart based on man, machine, method, material and environment (4M1E) from **Table Q1**.

(5 marks)

Table Q1

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

(c)   Propose **FIVE (5)** solutions for improvement based on two main causes as stated in **Table Q1** using Tree Diagram.

(10 marks)

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

Table Q2

SAMPLE	SAMPLE QUANTITY	DEFECTS	PROPOSITION
1	170	50	0.29
2	159	66	0.42
3	150	67	0.45
4	116	60	0.52
5	160	57	0.36
6	170	59	0.35
7	76	35	0.46
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	4039		11.37

Calculate:

(a) $\bar{\bar{P}}$

(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 based on the result in **Q2(e)** whether the process
   is stable or not.

(5 marks)

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

Table Q3

SUBGROUP NUMBER	DATE	TIME	MEASUREMENTS				AVERAGE X	RANGE R
			X1	X2	X3	X4		
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							826.25	220.00

Calculate:

(a) $\overline{\overline{X}}$

(3 marks)

(b) $\overline{R}$

(3 marks)

(c)   Upper Control Limit (UCLx).

(3 marks)

(d)   Lower Control Limit (LCLx).

(3 marks)

(e)   Upper Control Limit (UCLR).

(3 marks)

(f)   Draw X bar chart based on **Table Q3**.

(10 marks)

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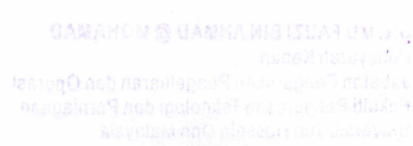
Q4   (a)   Differentiate between debugging phase and wear out phase in reliability curve.

(3 marks)

(b)   NSX 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 6 components, A, B, C, D, E and F, with reliability values of 0.875, 0.993, 0.886, 0.899, 0.970 and 0.999, respectively.

Calculate the system reliability if the components are in series.

(3 marks)

(d)   A system has 3 components, A,B and C, with reliability values of 0.982, 0.987 and 0.996, 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)
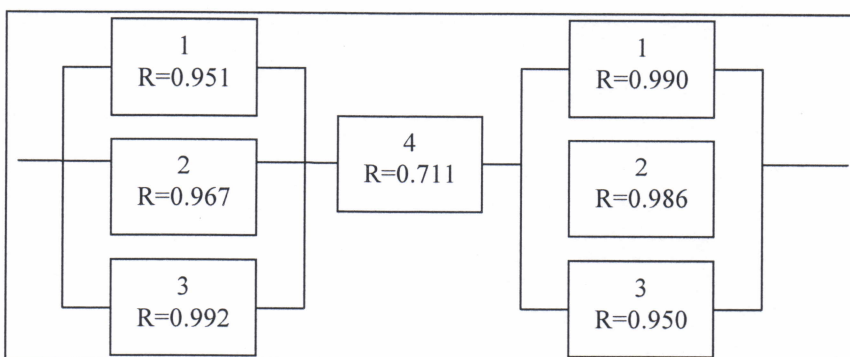
Figure Q4

(f)   KDK company has conducted life test for 10 units of new product. Four of the units failed after 6, 14, 17 and 24 hours, respectively. Six units were still operating at the end of 25 hours.

(i)   Calculate the failure rate at the end of 25 hours.

(3 marks)

(i)   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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