UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2010/2011

COURSE NAME	:	QUALITY CONTROL
COURSE CODE	:	BPC 22003 / BPC 2203
PROGRAMME	:	2 BPD
DATE OF EXAMINATION	:	APRIL / MAY 2011
DURATION	:	2 HOURS 30 MINUTES
DIRECTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF 7 PAGES

Q1 Statistics method is important for analyzing, interpreting and displaying data, which the main purpose to ensure process is stable and predictable.

(a) Explain:

(i) Accurate data

(3 marks)

(ii) Precise data

(3 marks)

(b) Define:

(i) Average

(2 marks)

(ii) Median

(2 marks)

(iii) Mode

(2 marks)

(c) A technican check the resistence value of coils and record the value in Ohm: X1=3.35, X2=3.37, X3=3.28 X4=3.34 and X5=3.30.

Calculate:

(i) Average

(3 marks)

(ii) Standard deviation

(4 marks)

(d) Tensile test on aluminium alloy rods are conducted at three difference times, which resulted in three different average values in megapascals (Mpa). On the first occasion, five test are conducted with the average of 207 Mpa; on the second occasion, six tests, with an average of 203 Mpa; and on the last occasion, 3 test, with an average of 206 Mpa.

Calculate the weighted average.

(6 marks)

Q2 (a) Variation occured in every process. Monitoring variation is essential to ensure each process is stable and predictable.

(i) Explain **THREE (3)** categories of variation.

(6 marks)

(ii) Describe **FOUR (4)** sources of the variation.

(8 marks)

(b) Explain:

(i) Common cause.

(2 marks)

(ii) Special cause.

(3 marks)

Table Q2(c): Measurement data for control chart

SUBGROUP NUMBER	DATE	TIME	MEASUREMENTS X_1	X_2	X_3	X_4	AVERAGE $\bar{X}$	RANGE R
1	12/26	8:50	35	40	32	37	6.36	0.08
2		11:30	46	37	36	41	6.40	0.10
3		1:45	34	40	34	36	6.36	0.06
4		3:45	69	64	68	59	6.65	0.10
5		4:20	38	34	44	40	6.39	0.10
6	12/27	8:35	42	41	43	34	6.40	0.09
7		9:00	44	41	41	46	6.43	0.05
8		9:40	33	41	38	36	6.37	0.08
9		1:30	48	44	47	45	6.46	0.04
10		2:50	47	43	36	42	6.42	0.11
11	12/28	8:30	38	41	39	38	6.39	0.03
12		1:35	37	37	41	37	6.38	0.04
13		2:25	40	38	47	35	6.40	0.12
14		2:35	38	39	45	42	6.41	0.07
15		3:55	50	42	43	45	6.45	0.08
16	12/29	8:25	33	35	29	39	6.34	0.10
17		9:25	41	40	29	34	6.36	0.12
18		11:00	38	44	28	58	6.42	0.30
19		2:35	35	41	37	38	6.38	0.06
20		3:15	56	55	45	48	6.51	0.11
21	12/30	9:35	38	40	45	37	6.40	0.08
22		10:20	39	42	35	40	6.39	0.07
23		11:35	42	39	39	36	6.39	0.06
24		2:00	43	36	35	38	6.38	0.08
25		4:25	39	38	43	44	6.41	0.06
Sum							160.25	2.19

(c) Measurement data for control chart was collected as Table Q2(c).
(Assume A_2 for a subgroup size (n) of 4 is 0.729)

Calculate:

(i) X double bar

(2 marks)

(ii) Upper Control Limit (UCL)

(2 marks)

(iii) Lower Control Limit (LCL)

(2 marks)

Q3 (a) State **THREE (3)** theorems of probability.

(6 marks)

(b) Define:

i) Permutations

(2 marks)

ii) Combination

(2 marks)

(c) **Table Q3(c):** Inspection results by supplier

Supplier	Number Conforming	Number Nonconforming	Total
X	50	3	53
Y	125	6	131
Z	75	2	77
Total	250	11	261

(i) Calculate the probability of selecting a random part produced by supplier X or supplier Z.

(3 marks)

(ii) Calculate the probability that a randomly selected part will be from supplier Z, nonconforming unit from supplier X, or confirming part from supplier Y.

(3 marks)

(iii) Calculate the probability that a randomly selected part will be from supplier X or nonconforming units.

(3 marks)

(iv) Assume that the first parts is returned to the box before the second parts is selected (called with replacement).

Calculate the probability that two randomly selected parts will be from supplier X and supplier Y.

(3 marks)

(v) Calculate the probability that two randomly selected parts (with replacement) will have one conforming part from supplier X and one conforming part from supplier Y or supplier Z.

(3 marks)

Q4 Reliability is important to ensure the product quality for customer satisfaction.

(a) Define reliability.

(3 marks)

(b) Explain **THREE (3)** phases of the "bathub" curve.

(6 marks)

(c) A system has 5 components, A,B,C,D and E, with reliability values of 0.985, 0.890, 0.985, 0.999 and 0.999, repectively.

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 0.989, 0.996 and 0.994, repectively.

Calculate the system reliability if the components are in parallel.

(3 marks)

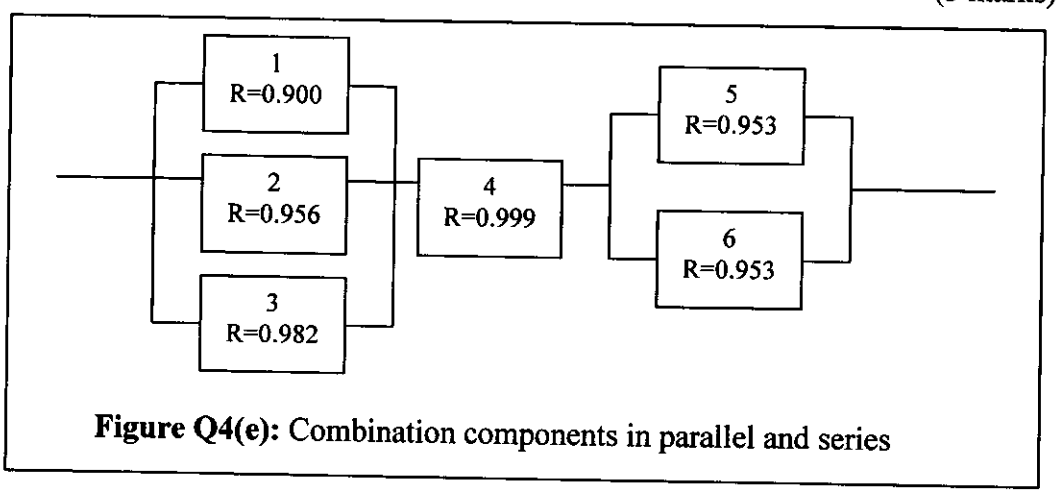

Figure Q4(e): Combination components in parallel and series

(e) Calculate the reliability of the system in fiqure Q4(e).

(4 marks)

(f) Four of the items failed after 4, 12, 15 and 21 hours, respectively. Five items were still operating at the end of 22 hours.

Calculate the failure rate for an item that has the test of 9 items terminated at the end of 22 hours.

(3 marks)

(g) Assume that there is a constant failure rate.

Calculate the mean life that has failure rate of 0.025.

(3 marks)

END OF QUESTION PAPER