



**UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY**

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

COURSE CODE : JQD 20403
COURSE TITLE : STATISTICAL PROCESS CONTROL
PROGRAMME LEVEL : DIPLOMA
DATE : 31 MAY 2016
TIME : 2.30 PM – 5.30 PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
 2. This question paper is printed on both sides of the paper.
 3. This question paper consists of TWO (2) sections.
 4. Answer ALL questions in Section A. Choose TWO (2) questions in section B.
 5. Please write your answers on the answer booklet provided.
 6. Table and formula are enclosed as reference.
 7. Please answer all questions in English only.
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THERE ARE 4 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

Data set may depend on the goal or objectives of the study, explain the need of research below:

- (a) DPU (5 marks)
- (b) Process Capability (5 marks)
- (c) Attribute Data (5 marks)
- (d) Go-No Go (5 marks)

Question 2

- (a) The seven tools that called "The Magnificent seven" are important part of SPC and helps create an environment in which all individuals in an organization seek continuous improvement in quality and productivity. Choose **THREE (3)** of these 7 tools and describe the function of each tool. (9 marks)
- (b) Determine data that can be access and obtain. (5 marks)
- (c) Miyami Sdn Bhd is a car manufacturer in Malaysia. In order to analyse the performance of company product (ex; no of defect car), describe which type of distribution suitable to use. Justify your answer. (6 marks)

Question 3

(a) In order to analyse the data, there are two type of measurement can be used which are measurement of dispersion and measurement of central tendency. Differentiate these two measurements and give example for each measurement.

(7 marks)

(b) Yield strength of circular tubes with end caps is measured. The first yields (in Kn) are as follows 96, 102 ,108, 126, 128, 150, 156, 103, 210, 105

- i. Calculate the sample average
- ii. Calculate the sample standard deviation

(9 marks)

(c) Referring to answer in question a., the product of the part will be rejected when the standard deviation is increase above that 35. If the next sample taken from the lot and the measurement of yield strength is 187, determine whether the sample taken is acceptable or reject.

(4 marks)

SECTION B (Total: 40 marks)**INSTRUCTION: Answer TWO (2) questions****Please use the answer booklet provided****Question 1**

- (a) Differentiate between the X bar R chart and X bar S chart with industrial example.
(10 marks)
- (b) Differentiate P-Chart and U-Chart with proper example of processes, products and defects
(10 marks)

Question 2

The content of % carbon in a metal is being analysed. Twelve bottles, randomly selected from the process are measured and the results are as follows:

16.05 16.03 16.02 16.04 16.05 16.01
16.00 16.07 16.02 16.02 16.03 16.01

- (a) Construct a box plot for the data given
(10 marks)
- (b) Find the median of the data.
(5 marks)
- (c) Level of change could the % carbon measurement increase without changing the sample median
(5 marks)

Question 3

- a. Differentiate between the continuous data and discrete data with suitable examples.
(6 marks)
- b. As an engineer at automotive company, Zakri want to analyse data collected from a turning machine. He found that measurement of central tendency and measurement of dispersion can help him during analyse the data. A sample of these data is presented in Table 1:

Table 1: Sample data

127	124	121	118	125
123	136	131	131	120
140	125	124	119	137
133	129	128	125	141
121	133	124	125	142
137	128	140	151	124
126	129	131	160	142
130	129	125	123	122

Note: It is desirable to have lower and upper limits

- i. Construct a histogram. Since there is not to have lower and upper limits, the class interval must be 5.
(9 marks)
- ii. As quality engineer have 170 set of data to be analysed for improvement plan, would you suggest the suitable tool to measure the central of tendency of the data? Justify your answer.
(5 marks)

END OF EXAMINATION PAPER

FORMULA

$$UCL = D_4 \bar{R}$$

$$\text{Center line} = \bar{R}$$

$$LCL = D_3 \bar{R}$$

$$UCL = \bar{x} + A_2 \bar{R}$$

$$\text{Center line} = \bar{x}$$

$$LCL = \bar{x} - A_2 \bar{R}$$

$$UCL = \bar{x} + A_3 \bar{s}$$

$$\text{Center line} = \bar{x}$$

$$LCL = \bar{x} - A_3 \bar{s}$$

$$UCL = B_4 \bar{s}$$

$$\text{Center line} = \bar{s}$$

$$LCL = B_3 \bar{s}$$

$$C_p = \frac{USL - LSL}{6\sigma}$$

$$C_l = \min \left(C_{pu} = \frac{USL - \mu}{3\sigma}, C_{pl} = \frac{\mu - LSL}{3\sigma} \right)$$

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} \quad LCL = \bar{p} - 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

$$UCL = np_o + 3 \sqrt{np_o(1-p_o)}$$

$$LCL = np_o - 3 \sqrt{np_o(1-p_o)}$$

$$UCL = \bar{c} + 3 \sqrt{\bar{c}}$$

$$LCL = \bar{c} - 3 \sqrt{\bar{c}}$$

$$LCL = \bar{u} - 3 \sqrt{\frac{\bar{u}}{n}}$$

$$UCL = \bar{u} + 3 \sqrt{\frac{\bar{u}}{n}}$$