**CHUKA**  **UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD DEGREE OF BACHELOR OF COMMERCE**

**BCOM 366: STATISTICAL QUALITY CONTROL**

**STREAMS:** **TIME: 2 HOURS**

**DAY/DATE: THURSDAY 9/04/2020** **11.30 A.M - 1.30 P.M.**

**INSTRUCTIONS**

1. Answer questions **ONE** and any other **TWO.**

**QUESTION ONE**

(a) In addition to being critical element in operations, quality has other implications. Discuss this statement and highlight importance of quality to a firm. [8 Marks]

(b) Explain role of inspection in statistical quality control. [4 Marks]

(c) 20 Television sets were examined for quality control test. The number of defects for each television set are recorded belw: 2, 4, 3, 1, 1, 2, 5, 3, 6, 7, 3, 1, 4, 2, 1, 3, 4, 6, 1, 1 .

Required:

i) Prepare C- chart [8 Marks]

ii) What conclusion can you draw from it ? [2 Marks]

(d) Discuss variations that may affect the quality of a product. [4 Marks]

(e) Discuss ways in which quality of a product may be controlled in a manufacturing plant. [4 Marks]

**QUESTION TWO:**

(a) Discuss role of acceptance sampling in quality control. [4 Marks]

(b) A certain food company puts Mango juice cans advertised as containing 200grams of juice. The weights of the juice drained from cans immediately after filling for 20 samples are taken by a random method. Each sample includes 4 cans. The samples are tabulated in the following table. The weights in the table are given in units of grams in excess of 200gms.
Required (i) Construct an chart to control the weights of Mango juice for the filling.

[10 Marks]

iii) Comment on the quality standards of this firm. [2 Marks]

| Sample number | Weight of each can (4 cans in each sample n=4) x | | | |
|---|---|---|---|---|
| 1 | 15 | 12 | 13 | 20 |
| 2 | 10 | 8 | 8 | 14 |
| 3 | 8 | 15 | 17 | 10 |
| 4 | 12 | 17 | 11 | 12 |
| 5 | 18 | 13 | 15 | 4 |
| 6 | 20 | 16 | 14 | 20 |
| 7 | 15 | 19 | 23 | 17 |
| 8 | 13 | 23 | 14 | 16 |
| 9 | 9 | 8 | 18 | 5 |
| 10 | 6 | 10 | 24 | 20 |
| 11 | 5 | 12 | 20 | 15 |
| 12 | 3 | 15 | 18 | 18 |
| 13 | 6 | 18 | 12 | 10 |
| 14 | 12 | 9 | 15 | 18 |
| 15 | 15 | 15 | 6 | 16 |
| 16 | 18 | 17 | 8 | 15 |
| 17 | 13 | 16 | 5 | 4 |
| 18 | 10 | 20 | 8 | 10 |
| 19 | 5 | 15 | 10 | 12 |
| 20 | 6 | 14 | 12 | 14 |

(c ) Discuss two factors to consider when setting up control limits. [4 Marks]

**QUESTION THREE**

(a) Discuss three types of acceptance sampling plans that are commonly used for quality control. [6 Marks]

(b) Explain two advantages of double sampling plan. [4 Marks]

(c ) Required: Determine the upper and lower and control chart limits. [4 Marks]

(d) ABC is a producer of decaffeinated coffee, bottles NF. Each bottle should have a net weight of 4 ounces. Te machine that fills the bottles with coffee is new, and the operations manager wants to make sure its properly adjusted. He randomly selects and weighs n= 8 bottles and records the average and range in ounces for each sample. The data for several samples is given in the table below.

| Sample | Sample Range | Sample Average |
|---|---|---|
| A | 0.41 | 4.00 |
| B | 0.55 | 4.16 |
| C | 0.44 | 3.99 |
| D | 0.48 | 4.00 |
| E | 0.56 | 4.17 |
| F | 0.62 | 3.93 |
| G | 0.54 | 3.98 |
| H | 0.44 | 4.01 |

Required: Determine if the machine is properly adjusted and in control. [6 Marks]

**QUESTION FOUR**

(a) Discuss managerial issues in relation to use of control charts. [6 Marks]

(b) A random sample of 200 was taken from daily production of large output of pens and number of defective pens was noted. On the basis of information given below;

(i) Prepare a control chart for fraction defective. [10 Marks]

(ii) What conclusion do you draw from the control chart ? [2 Marks)

| Production each day | No of defectives | Production Each day | No of defectives |
|---|---|---|---|
| 1 | 10 | 8 | 4 |
| 2 | 5 | 9 | 12 |
| 3 | 10 | 10 | 24 |
| 4 | 12 | 11 | 21 |
| 5 | 11 | 12 | 15 |
| 6 | 9 | 13 | 8 |
| 7 | 22 | 14 | 14 |

| Production each day | No of defectives | production each day | No of defectives |
|---|---|---|---|
| 15 | 4 | 22 | 9 |
| 16 | 10 | 23 | 11 |
| 17 | 12 | 24 | 12 |
| 18 | 11 | | |
| 19 | 26 | | |
| 20 | 13 | | |
| 21 | 10 | | |

(i) Explain the following terms as used in statistical process control.

(ii) Acceptable Quality level (AQL) [2 Marks]

(iii) Lot tolerance percent defective (LTPD) [2 Marks]

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